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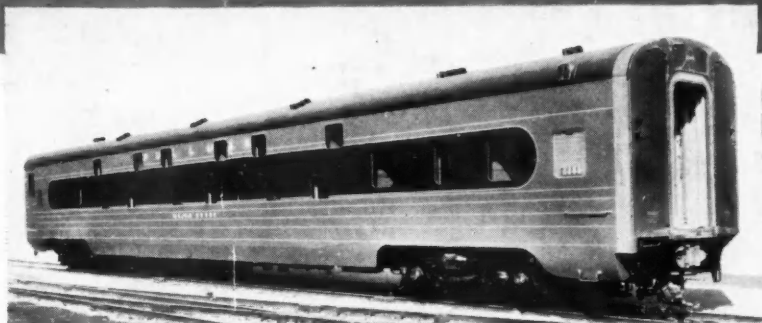
AUG 9 1938

AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

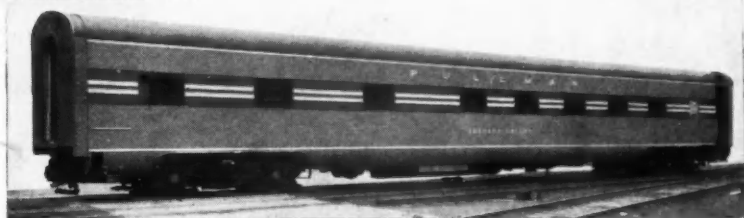
AUGUST 6, 1938

74 NEW STREAMLINED PULLMAN CARS GO ON TIMKEN BEARINGS



One of the 52 new Pullman cars for the Pennsylvania Railroad. All journals equipped with TIMKEN Bearings.

One of the 22 new Pullman cars for the New York Central System. All journals equipped with TIMKEN Bearings.



74 of the 104 new streamlined Pullman sleeping cars built by the Pullman Standard Car Manufacturing Company for service on the Pennsylvania and the New York Central Railroads are equipped with TIMKEN Tapered Roller Bearings. A number of these new Timken Bearing Equipped cars will be used by the Pennsylvania Railroad in its renowned "Blue Ribbon Fleet" including the "Broadway Limited", "The General", "Liberty Limited" and "Spirit of St. Louis". The remainder will be used by the New York Central mostly in the service of the famous "Twentieth Century Limited". The success leading American Railroads have enjoyed with TIMKEN Bearings has its parallel throughout all industry. You want this same dependability and endurance in your automobiles.



A symbol of quality for any piece of equipment with which it is associated

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN

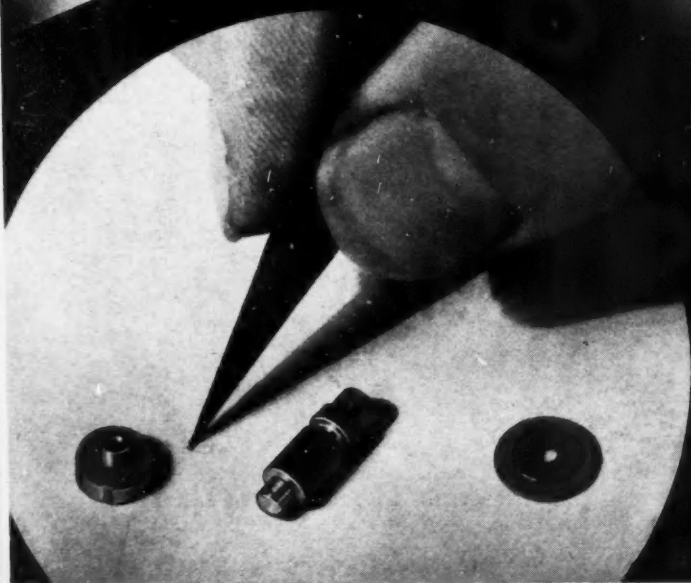
TAPERED ROLLER BEARINGS

PRODUCTION
INCREASED 300%

54 HOURS SAVED
ON 7,000 PIECES

100 HOURS SAVED
ON 12,000 PIECES

COSTS REDUCED
BETTER THAN HALF



UNION COLD



★★★ *And Here is How it Happened!*

Dissatisfied with the quality and cost of his screw machine parts, a manufacturer of business machines decided to conduct a thorough investigation.

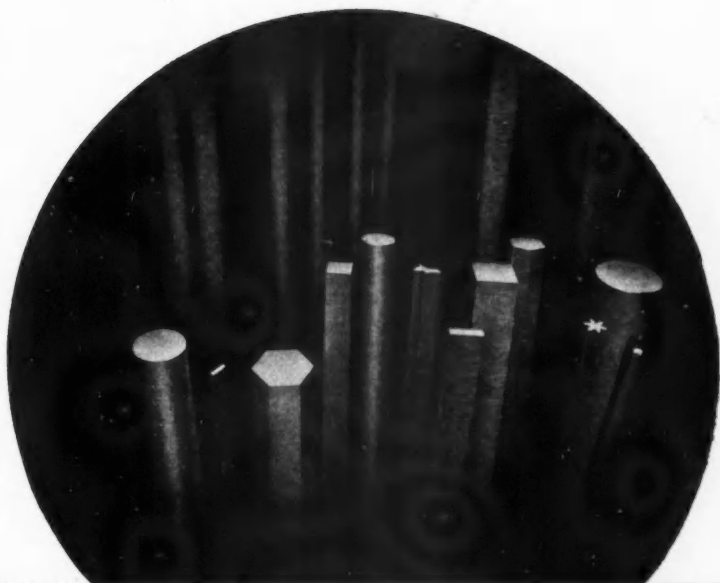
He advanced speeds and feeds to full capacity. He experimented with cutting oils and changed to the best oil obtainable. Both proved helpful—but the manufacturer felt that further improvements could be made—so he called in a Union Drawn Field Service Man.

Working together, they redesigned the cams, simplified and systematized the set-ups, and changed from ordinary screw machine stock to Union Cold Drawn bars.

The results of all of these changes were beyond all expectations. Production was increased as much as 300% on some items. On one part, 54 hours time was saved in producing 7,000 pieces. On another part, 100 hours were saved on 12,000 pieces. Costs on certain parts dropped better than half. In a short time, the savings effected paid for the new cams and tools; from then on, they became profit for the manufacturer. And, as usually happens when a change is made

to Union Cold Drawn Steels, the parts showed a much better finish.

Are your machines delivering the full capacity of which they are capable? Are your set-ups as simple as they might be? Are the steels you are using the best for each particular job? If there is the slightest doubt in your mind on any of these questions, ask us to send a Union Drawn Field Service Man. His recommendations have pointed the way to lower costs, higher profits and better products for others—they can do the same for you. Union Drawn Steel Division of Republic Steel Corporation, Massillon, Ohio.

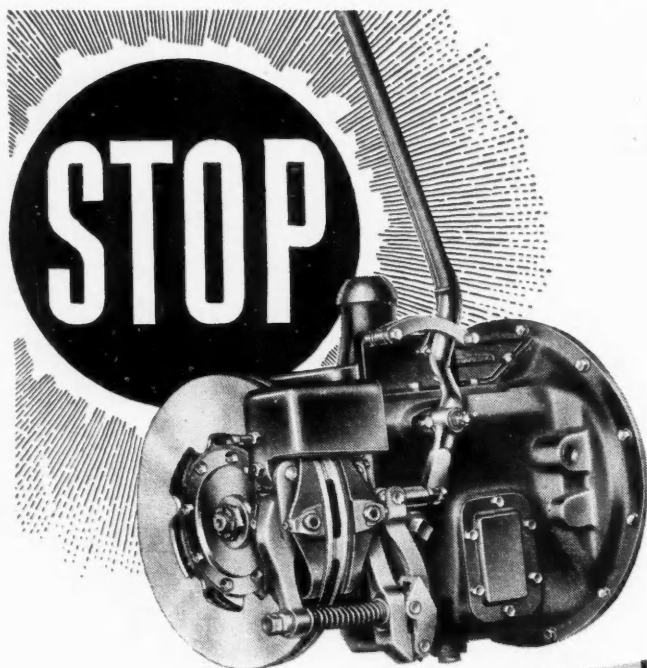


*Write for copy of our new booklet,
"Cutting Costs with Cold Drawn Steel."*

DRAWN STEELS

In Addition to Free Machining Steels, Union Drawn also Produces

- UNION COLD DRAWN SPECIAL SECTIONS • UNION PRECISION SHAFTING
- UNION COLD FINISHED ALLOY STEELS • UNION SPECIAL FINISH



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● The TRU-STOP Emergency Brake has the powerful, positive braking action that brings a heavily loaded truck to a quick, smooth stop. There is no noise, chatter or grabbing—but the vehicle is always stopped in a short distance.

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AUTOMOTIVE DIVISION, DETROIT, MICHIGAN

AMERICAN CHAIN & CABLE COMPANY, Inc.

Manufacturers of the famous Weed
American Bar-Reinforced Tire Chains

In Business for Your Safety



TRU-STOP Emergency BRAKES

TRU-LEVEL OIL CONTROLLER

After exhaustive tests the Tru-Level Oil Controller is being adopted by car and truck manufacturers in production and is also being ordered by fleet owners for installation. It protects equipment and saves money by maintaining a proper level of oil in crank case at all times. It can't go wrong. Manufactured by American Chain & Cable Company, Inc., 12-252 General Motors Building, Detroit, Michigan.

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 79

Number 6

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August 6, 1938

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AUTOMOTIVE INDUSTRIES

Vol. 79, No. 6
August 6, 1938

Production

Shutdowns Shave Output For Week to 15,600

Car and truck production figures for the week ending Aug. 6 took on a brighter aspect than originally anticipated with the decision of Chevrolet to continue assemblies following a contra-seasonal gain in sales in July over June.

With a majority of plants closed down for inventory or engaged in change-overs in preparation for production of 1939 models the continued operations of this major producer brought the week's output to approximately 15,600 cars and trucks, according to a preliminary survey of factory schedules. Other contributors to the total were Hudson, Studebaker and Nash.

Ford assembly plants will be inoperative for the first two weeks in August for the annual inventory and vacation period but are expected to resume on 1938 models on Aug. 15.

Not only did Chevrolet dealers show a gain over June in new car sales and in used car sales, but they also succeeded in making material reductions in their used car stocks, according to Wm. E. Holler, general sales manager. The normal trend indicates a seasonal decline between July and June. Reports from other producers indicate that the more favorable sales picture evident during the past month assured a healthy reduction in new and used car stocks to place most dealers in a stronger inventory position when the new car season arrives.

It appears likely that there will be some early announcements of 1939 models based on the plans of one important manufacturer to hold its annual press preview late in August.
—J.A.L.

Thomas A. Aspell

Thomas A. Aspell, 54, for 10 years manager of original equipment tire sales for the B. F. Goodrich Co., of Akron, died Aug. 1.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity (Week Ending Aug. 6)

BUSES Operations averaging 50 per cent capacity continue in general in this field with substantial improvement not expected until early fall.

TRUCKS Output levels of several weeks preceding sustained. Typical large producer working five days a week but only half days, with production said to be about 40 per cent off from last year.

TRACTORS Unless volume of orders perks up, several plants may shut down for indefinite period on Aug. 15. Several implement plants reported in operation again after July shutdowns as orders are reported to be "coming in well."

AUTOMOBILES Decision of one large manufacturer to continue assemblies following contra-seasonal gain in sales in July over June improves output picture. Early announcements of 1939 models appears likely as one important manufacturer plans to hold press preview late in August.

MARINE ENGINES Sales are reported to be running well ahead of last year. One company claims to be almost 40 per cent ahead, with export sales also holding up. Business seems to be distributed over entire range of engine sizes. Improvement in production seen by December.

AIRCRAFT ENGINES Eastern seaboard builders still going top speed. Sales of aircraft engines, spare parts, and aircraft reported 47 per cent ahead during the first half of this year as compared with the similar period of 1937 by the Aeronautical Chamber of Commerce.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

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Cobb Comes to Conquer

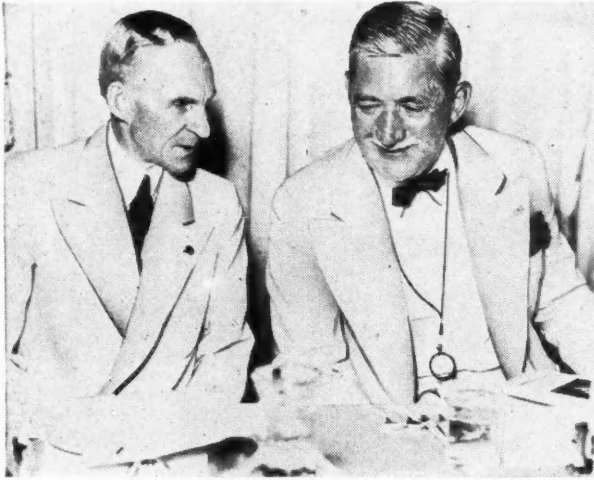
Englishman on Way to Bonneville Salt Flats Hopes to Prove Unconventional Railton Car "Fastest Thing on Wheels"

Reid Railton threw a good many established principles of automotive design out of the window when he built John R. Cobb's 2500 h.p. streamlined racer. But Mr. Cobb told AUTOMOTIVE INDUSTRIES, as the "Aquitania" was steaming slowly up New York Bay this week, that the "Railton," as he calls it, is the fastest thing on wheels. He'll try to prove it on the 13-mile straightaway of the Bonneville Salt Flats in Utah as soon as the road bed is solid enough. He, with Mr. Railton, L. H. Cade, and Harcourt Wood left New York immediately for Utah.

Beetle-like, the speed monster is 28 ft. 6 in. long, 8 ft. wide at the beam, and 4 ft. 3 in. overall height.

It weighs 6720 lb., the limit set by the Dunlop engineers for four wheels. The front drive wheels are independently sprung, and driven by one of the 1250 h.p. Napier Lion engines. The rear axle is driven by the other engine of the same output.

Instead of using a frame, Mr. Railton used a curved spine, a rigid member shaped something like an elongated "s." Forks at the forward and rear ends support the axles. Amazing as is this departure from conventional design, the engines are set at an angle of about 10 deg. from the centerline of the curved spine. The forward engine drives the rear axle through a three-speed trans-
(Turn to page 159, please)



International

BIRTHDAY

of Henry Ford, 75 on July 30, brought additional honors to the pioneer automobile manufacturer as Detroit proclaimed a civic holiday and prominent leaders of industry joined in the celebration. William S. Knudsen, president of General Motors Corp., is shown here (right) with Mr. Ford at a banquet attended by 1500. It was "just another birthday and I have no intention of slowing down," said the guest of honor.

made two years ago by Renault, of France. However, Renault's Japanese assembly plant had to suspend operation recently because of exchange transfer difficulties.

In the light of Japan's recent diplomatic tie-ups it is therefore interesting to note that these difficulties have been overcome in the case of Italy.

GM Declares Dividend of 25 Cents on Common

General Motors Corp. this week declared a dividend of 25 cents per share on the outstanding common stock, payable Sept. 12, 1938, to stockholders of record Aug. 11, 1938. The regular quarterly dividend of \$1.25 per share on the \$5 preferred stock is payable Nov. 1, 1938, to stockholders of record Oct. 10, 1938.

Automotive News from Nippon

Italo-Manchu-Japanese Trade Pact Said to Provide for Importation of \$1,262,400 Worth of Fiats

Although the full text of the Italo-Manchu-Japanese trade pact, signed in Tokyo on July 5, is still unknown, it is understood on good authority that the agreement provides for the importation into Japan and Manchukuo of Italian-made Fiat automobiles to the amount of 24,000,000 lire (approximately \$1,262,400) annually. The agreement is considered important in view of the difficulties now attending imports of cars into Japan.

Fiat's Far Eastern representative,

Mr. Cavari, has already moved his head office from Shanghai to the Imperial Hotel, Tokyo. First shipments of Fiat cars and trucks are scheduled to arrive in September.

Prior to the establishment of assembly plants by American motor firms some 10 years ago, Fiat cars had a good sale in Japan, but importation subsequently stopped under the increasing pressure of the American competition. A second attempt by an European firm to snatch some share of the Japanese market was

C.I.T. Earnings for Six Months Total \$7,866,166

Commercial Investment Trust Corp. has reported combined net earnings of \$7,886,166 for six months ended June 30, a decrease as compared with \$11,573,865 for the first half of 1937. Undistributed net earnings of National Surety Corp. (a wholly owned subsidiary) for the first six months, amounting to \$1,012,709, are included in the combined net.

After dividends on the preference stock, there remained net earnings applicable to the common stock of \$7,663,354 equivalent to \$2.31 per share.

New Truck Registrations

Slow, steady shrinkage in new truck registrations brought the total* for June down to 30,232 units, a decrease of roughly six per cent as compared with the May figure. Comparison of the June total with that of the same month in 1937 is expressed by a minus 47 per cent.

	June	May	June	SIX MONTHS		Per Cent Change, 6 Months 1938 over 1937	Per Cent of Total Six Months	
	1938	1938	1937	1938	1937		1938	1937
Chevrolet	9,912	10,659	16,703	63,651	97,499	- 34.8	33.21	29.24
Ford	8,427	8,918	17,414	53,329	112,255	- 52.5	27.82	33.68
International	4,045	4,278	6,681	26,656	37,385	- 28.7	13.90	11.22
Dodge	3,055	3,171	6,048	19,159	30,790	- 37.7	9.99	9.24
G. M. C.	1,730	1,810	4,035	10,571	22,980	- 54.0	5.51	6.89
Plymouth	681	662	1,634	4,099	6,228	- 34.1	2.14	1.87
Diamond T	332	360	644	2,138	4,546	- 53.0	1.12	1.36
Mack	317	382	536	1,888	2,922	- 35.3	.98	.88
White	271	323	513	1,799	3,226	- 44.2	.94	.97
Reo	213	287	435	1,432	2,357	- 39.1	.75	.71
Willys-Overland	196	168	82	1,027	524	+ 96.0	.54	.16
Studebaker	158	221	643	1,026	2,897	- 64.6	.54	.87
Autocar	235	193	197	881	1,043	- 15.5	.46	.31
Federal	95	93	223	687	1,415	- 51.5	.36	.42
Brockway	116	159	139	609	863	- 29.5	.32	.26
Divco	120	150	109	594	651	- 8.8	.31	.20
Hudson	65	68	554	468	2,697	- 83.0	.24	.81
Indiana	37	44	155	239	802	- 70.2	.12	.24
Stewart	38	45	92	203	667	- 69.6	.11	.20
F. W. D.	22	14	29	181	212	- 14.5	.09	.06
Pontiac	41	32	160	173	173	- 34.0	.06	.05
Sterling	21	25	33	114	114	- 74.6	.04	.10
Stutz Pak-Age Car	2	5	80	84	84	- 16.3	.37	.26
Miscellaneous	103	139	156	718	718			
Total	30,232	32,206	57,135	191,713	333,320	- 42.5	100.00	100.00

* Does not include returns from Wisconsin. All data are comparable.

... slants

DETERMINED to increase the motor vehicle traffic for the benefit of its far flung regions, the Mexican government is reportedly arranging to spend 260,000,000 pesos (approximately \$52,000,000) to increase to 52,000 its present highway network of about 12,500 kilometers.

UNIQUE silver coin commemorating the role of the automobile in opening up isolated territories in China to outside trade and commerce has been brought to this country by Miss A. Viola Smith, United States Trade Commissioner in Shanghai. The motor car dollar, bearing the impression of a sedan of American design, is circulated in interior China where it was minted in 1928 by order of the provincial governor, Chow Hsi-cheng, in recognition of

the first automobile to operate in Kweichow province.

PROBABLY a record air express shipment was the cargo of 970 lb. of castings and machined parts sent recently by Allis-Chalmers Mfg. Co., Milwaukee, to its Canadian subsidiary at Montreal, Que.

"INSTEAD of being an enemy of the railroad business, the automobile is now recognized as a feeder of end stimulant to the railroads, and a builder of the travel appetite," said Edward G. Budd, builder of light-weight stainless steel trains, in a recent nation-wide radio broadcast released by the National Association of Manufacturers.

June Casing Shipments Rise 19.4 Per Cent Over May

Shipments of pneumatic casings during the month of June, 1938, estimated at 4,025,018 units by the Rubber Manufacturers Association, Inc., show an increase of 19.4 per cent over shipments made in May. Although June shipments were 25.3 per cent below shipments for June, 1937, this marks the third consecutive month that the comparison with last year's shipments has been more favorable than the previous month's comparison, indicating that the improvement in replacement demands continues.

The association estimates production of pneumatic casings for June at 3,111,913 units, an increase of 9.5 per cent above May, but 41.7 per cent below June, 1937.

Pneumatic casings in the hands of manufacturers June 30 are estimated at 8,811,603 units. This is 10.6 per cent under stocks on hand May 31 and 29.7 per cent below stocks on hand June 30, 1937.

Mexico's Automobile Business Steadily Declining

Automobile business in Mexico, excepting for some slight movement in small cars and trucks and second-hand vehicles, has become progressively worse owing to the acute economic depression, high import tariffs that have been in effect since last Jan. 20, and the weakness of the peso, a condition that developed with expropriation of the petroleum companies and has steadily increased.

Dealers are particularly hard hit because they contracted to supply cars and trucks on the installment plan at the exchange rate of 3.60 pesos per dollar. The dollar is now worth five pesos.

Automotive Industries

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes *

Dollar Volume of U. S. new car registrations fell to \$132,500,000 in June, decreasing approximately 12 per cent from the May estimate.

	NEW REGISTRATIONS			ESTIMATED DOLLAR VOLUME		
	June	Six Months		June	Six Months	
		Units	Per Cent of Total		Dollar Volume	Per Cent of Total
Chevrolet, Ford and Plymouth.....	91,300	564,478	59.67	\$68,800,000	\$425,100,000	51.77
Others under \$1000.....	33,895	210,004	22.20	31,000,000	192,000,000	23.37
\$1001-\$1500.....	25,990	160,142	16.93	28,900,000	179,000,000	21.80
\$1501-\$2000.....	985	6,884	.73	1,700,000	11,800,000	1.44
\$2001-\$3000.....	641	3,785	.40	1,700,000	10,100,000	1.23
\$3001 and over.....	91	662	.07	400,000	3,200,000	.39
Total.....	152,902	945,955	100.00	\$132,500,000	\$821,200,000	100.00
Miscellaneous.....	103	762				
Total.....	153,005	946,717				

* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes. Data do not include returns from Wisconsin.

To Push Small Diesel

Northill Co. Announces Plans for Large Output of Covic Engines

Exclusive national manufacturing and sales rights for the Covic Diesel engine have been acquired by Northill Co., Inc., Los Angeles, Calif., known as a manufacturer of equipment for the aircraft and marine industries. The Covic engine, of which an illustrated description was printed in AUTOMOTIVE INDUSTRIES for Feb. 22, 1936, is a two-cylinder opposed type suitable for light delivery wagons as well as for marine and industrial purposes. In 1936 the license for the manufacture of these engines was reported as in the hands of the Covic Diesel Engine Co. of Los Angeles, but apparently no industrial development of any conse-

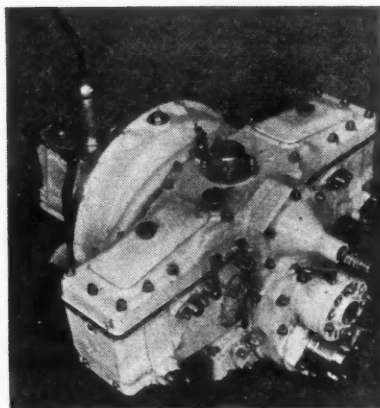
quence was undertaken by that concern.

The deal whereby Northill Co. has secured the rights to the engine was made known by John K. Northrop, former president of the Northrop Corp. and vice-president of the Douglas Aircraft Co., Inc., who is now vice-president and executive engineer of Northill Co. The Covic engine was originally developed in England by the Victor Engine Co. of Coventry, and several thousand of them are said to be in use in the British Navy, in fleets of delivery trucks, and in fishing and other marine vessels. In addition to being manufactured in England, the land of its origin, the engine is said to be in production in Holland, Switzerland and France.

The Covic engine has a bore of 3 5/32 in. and a stroke of 3 15/16 in., which gives it a displacement of 1 liter or 61 cu. in., and it is rated at 15-18 hp. The total weight of the bare engine, with hand-cranking system and 60-lb. flywheel, is 280 lb., while the complete marine engine with electric starter weighs 550 lb. and the automotive engine with four-speed transmission and electric starter and generator, 425 lb.

The Northill Co., through its sales director Ed Zuchelli, announces that a national sales organization will be established. Distribution in the Pacific Coast territory has been arranged for already, through the Covic Diesel Pacific Co., which is headed by James Garvey.

A contract for the manufacture of 1000 of these engines has been placed with the Menasco Mfg. Co., and manufacturing operations are said to have begun already.



COVIC DIESEL, a two-cylinder opposed type engine suitable for light delivery wagons as well as for marine and industrial purposes, which is to be produced in large numbers in this country according to announcement made by the Northill Co., Inc., Los Angeles, Calif.

August 6, 1938

Ourselves and Government

A weekly check list of legislative, executive and judicial actions affecting the automotive industries. First appeared in June 25 issue, p. 831.

Corrected to Aug. 4

CONGRESS

Adjourned June 16, sine die. All members of House and 36 Senators retire or face election in Autumn.

Legislative Legacies

MONOPOLY INVESTIGATION. Public hearings by the National Economic Committee (the anti-monopoly committee) may be started in October instead of September as previously planned.

AIRLINES. The five-man Civil Aeronautics Authority, empowered to exercise broad administrative and regulatory powers over air commerce under the McCarran bill (S. 3845) passed by Congress, held its third meeting on Monday. Individual members will be sworn in on Aug. 8. Expects to be functioning with adequate office space and personnel facilities by Aug. 23. Two members of the Air Safety Board have been named and President Roosevelt is expected to name a third member shortly.

WAGES & HOURS. Elmer F. Andrews, New York State Industrial Commissioner, who has been named administrator, is expected to go to Washington later this month to start preliminaries under the Fair Labor Standards Act. Indications are that the Labor Department, spurred by Secretary Frances Perkins, is anxious to have States pass supplemental wage and hour laws to fortify and broaden the whole wage-hour program. Less than six states now have minimum wage laws and in only two—Pennsylvania and Oklahoma—do they apply to both men and women.

DEPARTMENT OF JUSTICE

MONOPOLY. Federal Grand Jury in South Bend returned indictments May 28. Bonds of \$2,500 each have been filed by 18 individual defendants connected with General Motors. No action so far by other corporations or individuals indicated. (See A.I.—Jan. 15, 1933. Last detailed report A.I.—June 11, 1933.)

DEPARTMENT OF LABOR

AIRCRAFT LABOR. The Board expects to hold a supplementary hearing late in August on its proposal to fix 60 cents an hour as the minimum wage for workers employed by manufacturers in the aircraft industry in order to qualify for Government business. At least a dozen protests were filed by both industry and labor representatives and the supplementary hearing was scheduled as a result.

STEEL LABOR. Hearings held July 25-26 on SWOC demand that minimum common labor hourly rates in steel industry be fixed at 62½c. in the east; 60c. in the west and 45c. in the south under the Walsh-Healey Act. Board action expected to apply to Ford steel plants. The Board eventually plans to cover all industries doing business with the Government, including the automobile industry, although it may be among the last to be called before the Board.

WAR DEPARTMENT

Educational orders program, designed to familiarize industrial firms with the country's war-time requirements and facilitate industrial mobilization, expected to be fully under way by Sept. 1.

LABOR RELATIONS CASES

FORD VS. N.L.R.B.: Last report A. I., June 25, p. 828.

Francis M. Shea, trial examiner, has announced findings that the Ford Motor Co., allegedly discriminated against employees for union activities. He listed eight specific

unfair labor practices for which he said the company is responsible and recommended reinstatement with back pay of 50 employees at the Buffalo plant.

If the recommendations are accepted by the company, the Board said the company must post cease and desist notices for 30 days at the Buffalo plant and send a compliance report to the NLRB regional director in Buffalo before Aug. 8. The Board said that failure to comply will result in transfer of the case to the Washington office.

NLRB invalidated an AF of L closed shop contract covering 1000 employees of the Serrick Corp., Muncie, Ind., and granted sole bargaining rights to the UAWU, CIO affiliate, with whom the company was ordered to deal exclusively. The company was directed to rehire 18 workers allegedly discharged when they refused to join the Federation's International Association of Machinists and to end alleged efforts to encourage membership in the AF of L union. The Board's decision was unanimous and overruled the findings of its trial examiner in the case.

Joseph A. Padway, AF of L counsel, hinting that his group may ignore the Board's decision, characterized it as the result of "prejudice and bias" against his organization.

NLRB has certified the CIO's United Automobile Workers Union as the exclusive collective bargaining representative of hourly employees of General Motors Corp. at Fisher Body Oakland Division and Chevrolet Oakland Division and of General Motors Sales Corp. at Oakland Parts Division, Oakland, Calif. The election on which the certification was based was held July 8.

NLRB has certified AF of L's Federal Local Union No. 20893 as sole collective bargaining representative for production workers at the Rex Mfg. Co., Inc., Connersville, Ind. as a result of an election held May 20, at which the CIO's United Automobile Workers Union, Local 152 was defeated.

NLRB has dismissed a complaint issued in March against the Minneapolis-Moline Power Implement Co., which had charged that the company had discouraged membership in the AF of L's International Association of Machinists by discriminating against a union member. The IAM union had filed the charges with the Labor Board.

FEDERAL TRADE COMMISSION

INVESTIGATION under the Withrow-Minton Resolution (M.J. Res. 351) proceeding under direction of Dr. Francis Walker despite the fact the \$50,000 called for in the resolution was never appropri-

ated by Congress. Economic Division accountants, under authority of Withrow-Minton automobile manufacturer-dealer resolutions, actively working on books of three of the larger manufacturers and has completed studies in three large cities and continuing studies in eight other cities.

F.O.B. PRICES case vs. G.M. and Ford. Date for hearing expected to be fixed for some time in August. Complaint alleges advertising misleading because prices do not include standard equipment.

VS. GENERAL MOTORS on question of forcing dealers to purchase parts and accessories from G.M. sources only. Hearings scheduled to be resumed in New York on July 26 have been postponed until August 16. Everett Hayercraft is FTC attorney in charge.

SIX PER CENT CASE. F.T.C. cited Ford and General Motors in July, 1937, complaining of false and misleading representations in advertising prices of automobiles. Complaint alleges advertising 6 per cent charge on deferred payments by retail purchasers is misrepresentation because no provision is made for amortization. Case now in hands of trial examiner.

The proposed fair trade practice rules for retail automobile dealers, introduced at public hearings during last NADA meeting in Detroit (see A.I., April 30, 1938), are still under study by the FTC fair trade practice division headed by George McCorkle. Reports circulating in Washington to the effect the rules will be sent out to trade members for suggestions and objections shortly. Officials deny the report, insisting that FTC's work on the proposals is far from completed.

PUBLIC WORKS ADMINISTRATION

PWA has approved a \$26,000,000 grant and the RFC a \$32,000,000 loan to the State of Pennsylvania for its proposed 162-mile all-weather, super-highway between Pittsburgh and Harrisburg. Tolls will be charged to repay the RFC.

INTERSTATE COMMERCE COMMISSION

Over the protests of automobile manufacturers, the ICC has denied a request made in July, 1937, by the Chrysler Motor Corp., that case-hardened glass be permitted in the windows of trucks other than windshields. It has issued an order continuing its prohibition of the use of case-hardened tempered-glass in any door or window opening in any motor vehicle operated by common or contract carriers in interstate or foreign commerce. New vehicles must be equipped with laminated safety glass of the approved type and such glass must also be used for replacements.

Effective Oct. 1, the ICC has prescribed a maximum driving day of 10 hours to be followed by an 8-hour off-duty or rest period, or a weekly limitation of 60 hours on duty, for truck and bus drivers of com-

Advertising News Notes

BBDO's seventh office will open Sept. 1 in Cleveland, under the management of Clarence L. Davis, vice-president.

Major Edmond E. Fleming has joined Grace & Bement, Inc., as vice-president and member of the firm. With a background including experience with leading railroads, military and diplomatic service, writing on political, economic and military subjects, he will serve as consultant on organization procedure and industrial and public relations.

Plans of United Industrial Alcohol for launching its most dramatic promotion campaign for Super-Pyro anti-freeze will

be based upon weather maps. Usual times for the first freezes throughout the country will control releases, Leslie S. Gillette, states. Lambert & Feasley, New York, is the agency.

Two hundred and eighty-five business and technical papers of 349 reporting increased their circulations in 1937, but only 121 raised their one-time page rates, according to the Association of National Advertisers, Inc.

Stockholders of United Air Lines, Chicago, are being offered half-fares for 17 days. This is to acquaint them with the line's services, says W. A. Patterson, president.

mon and contract motor carriers. The Public Health Service has been directed to conduct studies covering the fatigue problem, and the ICC Motor Carriers Bureau will make further studies of accident reports "for the light they may throw on the effects of safety of operation of different periods of duty."

Prices Announced on Three New Bantam Models

Prices on the three new Bantam models have been announced as follows: The 4-passenger Speedster delivers at the factory in Butler for \$497.50; the Boulevard Delivery is also priced at \$497.50; the Station Wagon will sell for \$565.

Private Carriers' Group to Study Effect of Federal Regulation

The Private Carriers Organizing Committee, which set out weeks ago to do something about the mounting tide of restrictions and regulations covering the operation of private motor trucks, met in Washington last week and formed the National Council of Private Motor Truck Owners whose expressed purpose is to promote "the safe and economic use of highway transportation by agriculture and industry in private motor trucks."

Speaking in the interest of manufacturers, farmers, merchants and others who own and operate the 3,500,000 trucks as a part of their established business, spokesmen representing many of these highway users stressed the point that states have adopted widely varying sets of regulations affecting private vehicles and that costly difficulties in moving goods, particularly across state lines, are increasing daily as a result.

Among the initial activities outlined by the new organization, which plans to establish headquarters in Washington, will be to gather facts covering the effect of Federal regulation of hours of service and standards of equipment and to present such facts at forthcoming hearings at the Interstate Commerce Commission. The Council likewise plans to study laws and legislative proposals which might be construed as affecting the operations of private trucks under regulations exercised over for-hire carriers by state commissions. The organization also plans the presentation of related material to state legislatures and regulatory commissions.

A 16-member board of directors

was named at the meeting, attended by business and industrial groups representing, among others, the following: agriculture, bakeries, food products distributors, beverage bottlers, manufacturers of explosives, cleaners and dyers, brewers, retail stores, petroleum, automobile manufacturers, dairy products, mail order houses, ice cream manufacturers, live stock producers, and laundries.



E. J. COSFORD has been elected president of Mack Trucks of Canada, Limited, Toronto, Ont., in charge of Canadian operations.

D. J. HUTCHINS, formerly assistant sales manager in charge of the Truck and Commercial Division, has severed his connection with the Ford Motor Co. Mr. Hutchins spent 25 years with the company.

C. RAYMOND MESSENGER, president of the Chain Belt Co., Milwaukee, and chairman of the board of the Oliver Farm Equipment Co., Chicago, has been elected a member of the alumni board of Harvard University.

New Passenger Car Registrations

Reductions in new passenger car registrations for June as compared with May amounted to approximately 11.5 per cent, bring the total for the month to 153,005 units. The figures for June this year as compared with June a year ago show a drop of about 56.5 per cent.

Percentage-wise, the shrinkage for the first six months of 1938 compared with the similar period last year is indicated by the table appended by a minus 51.2. For the eight months of the model year the decrease amounted to 47.1 per cent.

	JUNE	MAY	JUNE	SIX MONTHS		Per Cent Change, 6 Months, 1938 over 1937	Per Cent of Total Six Months		EIGHT MONTHS MODEL YEAR		
	1938	1938	1937	1938	1937		1938	1937	1938	1937	Per Cent Change
Chevrolet	36,083	42,661	68,602	232,743	400,605	- 41.9	24.59	20.64	335,018	540,951	- 38.0
Ford	30,414	34,454	83,111	198,769	478,291	- 58.4	21.00	24.64	244,566	567,022	- 56.8
Plymouth	24,803	27,090	47,501	132,961	257,287	- 48.3	14.04	13.26	181,314	344,580	- 47.3
Buick	12,896	14,358	20,799	78,451	102,063	- 23.2	8.29	5.26	111,360	138,978	- 19.8
Dodge	8,608	9,713	25,671	53,488	140,699	- 62.0	5.65	7.25	78,400	181,770	- 56.9
Pontiac	8,060	8,689	22,221	49,336	113,166	- 56.5	5.21	5.83	71,609	144,522	- 50.5
Oldsmobile	7,545	8,614	20,589	46,434	104,273	- 55.5	4.91	5.37	65,983	127,913	- 48.5
Packard	4,041	4,650	9,332	25,070	56,471	- 55.7	2.65	2.91	35,634	70,638	- 49.5
Chrysler	4,022	4,502	9,001	24,805	46,955	- 47.1	2.62	2.42	36,880	59,039	- 37.5
Hudson	3,281	3,497	9,691	20,561	51,869	- 60.3	2.17	2.67	29,591	68,408	- 56.6
De Soto	3,039	3,231	7,401	18,574	38,797	- 52.1	1.96	2.00	27,540	47,751	- 42.4
Studebaker	2,712	2,836	6,914	16,852	39,715	- 57.5	1.78	2.05	24,309	51,651	- 52.9
Nash	2,557	2,899	6,972	16,041	37,054	- 56.6	1.69	1.91	22,650	44,706	- 49.3
Lincoln	1,529	1,575	2,334	9,307	13,857	- 32.8	.98	.71	12,699	17,540	- 27.5
La Salle	1,095	1,359	2,933	7,170	15,465	- 53.6	.76	.80	10,539	19,871	- 46.9
Willys	1,000	1,023	5,649	6,805	28,355	- 76.0	.72	1.46	11,169	30,031	- 62.8
Cadillac	825	1,078	1,121	5,585	6,642	- 15.8	.59	.34	6,824	8,955	- 23.8
Graham	300	356	1,372	2,411	7,473	- 67.8	.25	.39	3,744	9,950	- 62.4
Hupmobile	92	121		580			.06		805	22	
Pierce-Arrow	1	2	5	14	136	- 89.8		.01	28	236	- 88.3
Miscellaneous	102	107	215	755	1,576	- 52.1	.08	.08	1,060	3,427	- 69.1
Total	153,005	172,815	352,034	946,712	1,940,749	- 51.2	100.00	100.00	1,311,722	2,477,961	- 47.1
Chrysler Corp.	40,472	44,536	89,574	229,828	483,738	- 52.5	24.28	24.93	324,134	633,140	- 49.0
Ford and Lincoln	31,943	36,029	85,445	208,076	492,148	- 57.7	21.98	25.36	257,265	584,562	- 56.0
General Motors	66,504	76,759	136,265	419,719	742,214	- 43.4	44.33	38.24	601,333	981,190	- 38.8
All Others	14,086	15,491	40,750	89,089	222,649	- 60.7	9.41	11.47	128,990	279,069	- 53.8

* Returns from Wisconsin not included. All data are comparable.



Written by the Guaranty Trust Co., New York

The recent gains in general business activity were maintained last week. The index compiled by the *Journal of Commerce* stood at 72.3, as compared with 72.6 the week before and 101.0 a year ago. Some of the major manufacturing branches enjoyed an expanded wholesale demand; and there was a sharp rise in retail buying, with a resumption of turnover in those districts that had suffered from adverse weather. There was a sharp upturn in steel operations and small gains in electric output and bituminous coal production. These advances offset a drop in automobile production and petroleum runs-to-stills.

The first half of this year closed with the large export surplus of \$631,000,000, as compared with \$842,000,000 for the entire year 1929. It is believed that the level for the first six months virtually assures an export excess for 1938 larger than for any year since 1929.

Net railway operating income of Class 1 railroads during the first half of this year amounted to \$70,289,305, as compared with \$299,466,034 in the corresponding period in 1937 and \$369,416,250 in the first six months of 1930.

Railway freight loadings during

the week ended July 23 totaled 580,882 cars, which marks a decline of 21,418 cars below those in the preceding week, a drop of 186,588 cars below those a year ago, and a reduction of 150,099 cars below those two years ago.

Production of electricity by the electric light and power industry in the United States during the week ended July 23 was 7.7 per cent below that in the corresponding period last year.

Cash income from sales of farm products during June amounted to \$514,000,000, according to the Bureau of Agricultural Economics. Receipts during the first six months of this year totaled \$3,084,000,000, or 12 per cent below the figure reported for the corresponding period last year.

Fisher's index of wholesale commodity prices for the week ended July 30 stood at 81.6, as compared with 81.5 for the week before and 81.7 for two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended July 27 showed a decline of \$1,000,000 in holdings of discounted bills. Bills bought in the open market and Government securities remained unchanged. Money in circulation declined \$17,000,000, and the monetary gold stock rose \$13,000,000.

manufacturer of what the people want. Let the profit "go out of financing," in Mr. Fertig's phrase, and the smaller profit in small cars give stability to the lesser output schedules.

One of the present "five" small cars ready for the market is what the writer has been "aching for" ever since the cycle-car "craze" of 1913-14. It has a 71 cu. in. engine, 45-in. tread, 94-in. wheelbase and was reported by the "tape" capable of 100 m.p.h. And to sell at \$300. (Would you believe it, Veblen?)

Since upwards of 125 imported small cars have sold in California this year, let us forget—better, disbelieve—that "reductions must be made slowly to maintain an equilibrium with the used-car market." Use the big cars as they do rocks to make roads, grind them up to make little ones.

S. ROSS PARKER,
San Diego, Calif.

Anti-Fertig

Editor, AUTOMOTIVE INDUSTRIES:

Mr. Fertig said, "An approximate 20 per cent is too high a proportion of the national income to be spent for individual transportation given the purchasing power of today." The value of passenger cars sold in 1937 was approximately three and one-half billion dollars, which was just over 5 per cent of the national income. The cost of operating the cars and trucks in use in 1937 was about 8.6 billions of dollars and this includes a reserve for replacing those cars that wear out. This is less than 13 per cent of the national income in 1937.

Further on, Mr. Fertig says, "Our ideas on what is fit and proper, and upon which we are prone to base our estimate of the worth and soundness of instalment selling, go back to the time when this method of financing distribution was confined almost exclusively to automobiles." (Mr. Scoville suggests: See Seligman, Vol. 1, p. 117, for articles financed in 1925.) Whatever else was sold on credit was so limited in dollar volume as to have little effect on our economy." (Only about 50 per cent of the total, says Mr. Scoville.) Practically all houses are bought on credit. A large amount of merchandise of all kinds is bought on open account. A large part of the securities and commodities sold on exchanges are bought on credit. Life insurance is bought on the instalment plan. Manufacturers and merchants buy much of their merchandise on credit. In fact, the use of credit is so extensive that Mr. Fertig's statement just quoted is silly.

The United States Government is making a great use of credit to cover its expenses. The amount of money loaned on automobiles in 1937 was about \$1,740,000,000, and of this amount about 38 per cent was advanced to used car buyers. The loans outstanding at the end of 1937 were about 1.3 billions of dollars. This year the loans to automobile buyers will be less than a billion dollars, and the loans outstanding at the end of the year will be about \$600,000,000. These figures compare with total loans and investments of Federal Reserve Member Banks of about \$32,000,000,000. The indebtedness on automobiles is only 3 to 5 per cent of the loans and investments of Member Banks.

I quote again from Mr. Fertig, "The changes which have come about in the extent and practice of instalment business have altered the picture drastically. Three developments can be listed as most important. These are: Increase in the variety and volume of goods sold on the instalment plan. Expansion in number of credit sources and in the amount of funds available for credit. Willingness of the consumer to incur onerous contractual obligations." As a matter of fact, the instalment selling of automobiles is noted for its stability and not for the changes. Approximately the same percentage of cars are sold on time year after year in good years and in bad years. The following changes have taken place:

First—Financing charges have been reduced;

Letters

to AUTOMOTIVE INDUSTRIES

Pro-Fertig

Editor, AUTOMOTIVE INDUSTRIES:

Upon the desk of every American maker of motor cars should be placed a copy of the analysis by Mr. Arthur Fertig, in your July 9 issue, of the present semi-prostration of the automobile business. It is the most penetrating clarification of the subject the present writer has seen in 30 years of motor journal perusal.

Mr. Fertig has the perspicacity of a Bagehot, a Marshall. It would be interesting to see someone try to phrase the accuracy away from his economics. To attempt a brief of his article would be an exercise in space consumption. But the industry should heed what he says about saturation, instalment selling, the employment outlook now and in the delineable future, and especially his recorded fact, that "the unit price has been rising steadily."

Result to be pointed out? Just this: "Even subsidization of the motorist via the channel of dealer bankruptcy, which has been going on for years, cannot be maintained indefinitely."

Mr. Fertig writes with that reserve which evinces unconscious ebullition of ideas; but some of us consumers would like to yodel: "O, you told 'em, Veblen, three decades ago, how these 'honorable men' (Mark Antony irony!) were 'not to be blamed for bringing methods of the eighteenth century over into the nineteenth.'"

Again, certainly, the industry "will get nowhere without consideration of the basic problem of the consumer's capacity to pay. This is the heart of it all." Exactly, and that's what every automobile manufacturer ought to ponder long and well.

Briefly, in the present writer's opinion, the crying need is a small car—several small cars. Cars for transportation, that will eliminate the present superfluity of gadgets and costly invisibility. The American manufacturer has shied from the small car the past 30 years as stubbornly as did David Harum from the millinery shop where he bought his wife a hat that threw her into hysterics. "Fear of fear."

The well-maintained value of certain smaller cars in 1932-33 should apprise the

Second—The percentage of cars sold on time has shown a declining trend;

Third—The time required for completing the payments began to be extended in 1934 and was contracted somewhat late in 1937.

The percentage of cars sold on the installment plan reached a high-water mark in 1925. Since then the trend has been downward, and in 1937 the percentage of cars financed was close to the low of the last 13 years. Apparently the public is less willing to incur these obligations.

I quote again, "The sources of credit are no longer confined to a few large finance houses." The sources of credit never have been confined to a few large finance houses. Back in 1929 over 60 per cent of our cars that were sold on time were financed by dealers and small miscellaneous companies.

JOHN W. SCOVILLE,
Chrysler Corp.
Statistician.

Pro-Fertig

Editor, AUTOMOTIVE INDUSTRIES:

Arthur Fertig's article is a piece of statesmanship. The balance of the entire country is unquestionably upset by the mania of the people for new cars, with all the incidentals—cost of storage, financing, fuel, oil, insurance, etc.

The used car backwash will undoubtedly force a change in the picture . . . and the country will benefit in the long run.

R. E. MEDLAND,
Chicago.

Yellow Truck Reports Profit For First Six Months

Net sales of Yellow Truck & Coach Mfg. Co. for the six months ended June 30, 1938, were \$25,495,247, according to a report issued by Irving B. Babcock, president. Consolidated net profit for the six months ended June 30, 1938, amounted to \$321,245, after deducting provision for depreciation of \$526,000 for plants and equipment and provision for Federal taxes on income of \$90,000. The foregoing compares with net sales of \$37,981,161 and a net profit of \$1,576,649 for the six months ended June 30, 1937.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

Minor Mention

George E. Whitney, of the Whitney Motor Wagon Co., states that the long runs at high speed that are common practice for the motor wagon quickly use up any cyclometer he has been able to find. He says the little machines apparently get dizzy and spin around without reference to the mileage traveled. He therefore intends to register the mileage from the engine instead of the wheel.

From *The Horseless Age*,
August, 1898.

Automotive Industries

FLIGHT

picture of the new de Havilland Albatross monoplane designed for experimental mail carrying over the Atlantic. The beautiful machine is now in the hands of the Air Ministry at the R.A.F. Martlesham Heath, Suffolk, station for acceptance trials before the certificate of airworthiness is granted.



Globe

Automotive Metal Markets

Sheet Buying Leads in Finished Steel Market As Car Builders Order Body Stocks

Buying of sheets makes the best showing in the finished steel market, which is only another way of saying that this division of the steel industry, the only one so far to record a mild, but steady uptrend in automotive orders, because buying of body stock precedes that of other descriptions, leads in the development of better, all-around steel demand. Moderate improvement is noted in automotive orders for cold-finished steel bars and manufacturing wire.

The rate of primary steel output rose to virtually 40 per cent of capacity this week, the American Iron & Steel Institute's figure being 39.8 per cent. In the Michigan area, furnace operations have been lifted to double the depression low, so as to provide the requisite nest-egg of semi-finished steel for the confidently expected nearby upturn in demand from automobile manufacturers. Publicity releases bring news of plans for further extensions of Ford steel capacity.

Very little remains to be cleared up with reference to the new price and basing point set-up, automotive steel consumers by this time having a clear picture of their logical sources of supply, which, due to competitive equalization, remain largely the same as before.

Keen interest continues to be taken in steel producers' efforts to adjust wage scales to selling prices. Injection into discussions of this problem of the benefit to automobile manufacturers of maintenance of the highest possible purchasing power of labor is interpreted in the steel market as hot-weather union propaganda, steel company sales executives being convinced that their customers understand, as well as they do, that recent price reductions were made in anticipation of fair wage scale readjustments.

Monday was bank holiday in London, and when the London Metal Exchange is closed, hesitancy in the New York market is the rule. Some importers offered Straits tin for spot delivery at 43.90 cents, compared with 44¼ cents at the preceding week's close, thus interrupting the market's recent trend. At the resumption of business in London on Tuesday, the reaction here made for an easier tone. This, together with a dip in Sterling exchange, caused the price for spot Straits to recede to 43¾ cents. An interesting sidelight of the tin situation is that some traders interpret the use of the Billiton Co.'s large dredger "Karimata" in the recovering of gold from the British frigate "Lutine," which was wrecked in the Zuider Zee in 1799, as an indication that the outlook is none too cheerful for the tin producers, else the Billiton Company, one of the largest producers, would not have lent its largest dredger for such an outside job.

Another fractional advance was scored by copper, the price for electrolytic now being 10⅜ cents, this in spite of the general belief that consumers are fairly well covered for their next three months' requirements. Prices of automotive brasses, etc., were revised upwards in keeping with the advance. The export price remains at around 10⅜ cents. Utah Copper Co., a Kennecott Co. subsidiary, which closed down June 16, reopened its mine and concentrating plants this week, restoring employment to 2500 men.

Secondary aluminum producers have marked up their prices for standard alloy grades ¼ to ½ a cent per pound, better inquiry from automotive consumers being expected to furnish the necessary support.—W. C. H.

August 6, 1938

Labor

"Trial" Stirs Speculation On Union's Future

With the result of the "trial" of four suspended officers of the United Automobile Workers Union believed to be a foregone conclusion, industry and labor alike have been speculating on the effect it will have on the union's future course.

The bitter factional fight on the UAW's international executive board, which culminated in the trial, has undoubtedly weakened the morale of the entire membership although to a certain extent it also has served to accomplish the opposite result in verification of the old principle that "when things are otherwise dull there's nothing like a good fight to keep members interested."

The most unfortunate eventuality would be a breakup of the union into two separate camps and this development would be deplored by industry and labor alike. It would raise questions about the status of many of the agreements now in effect and could precipitate a whole new series of disturbances in the relations between employers and workers.

Resumption of the trial of the suspended officers on Aug. 6 was expected to be a mere formality. Homer Martin, UAW president, adjourned the trial on July 29 to the above date after constant bickering between counsel and members of the two sides had assumed circus proportions and had stymied all progress. The defendants were ordered to present their replies in writing to the charges filed against them and inasmuch as the board had been divided 12 to 6 against the defendants from the

start it was expected that the only outcome could be a decision upholding the charges.

Civil courts entered the controversy for the first time during the current week in connection with the suspension of six officers of the Tarrytown, N. Y., local of the UAW by the Martin administration. Supreme Court Justice Edward J. McGoldrick, in New York City, issued a show-cause order in which Martin and other UAW officers were asked to indicate why a permanent injunction should not be issued preventing them from interfering in the affairs of the Tarrytown local.

In Washington this past week Francis M. Shea, trial examiner for the National Labor Relations Board, ruled that the Ford Motor Co., at its Buffalo assembly plant, had violated the Wagner Labor Act and recommended that the company rehire 50 discharged UAW members and cease interfering with union activities. The ruling was based on a 12-day hearing held in Buffalo last winter. As in previous cases the company has the right to file exceptions to the examiner's report and request oral hearing before the NLRB.

Bendix Aviation Reports Profit for Second Quarter Operations

Bendix Aviation Corp. returned to a profitable basis during the second quarter of 1938, according to a statement issued by the corporation. During the first quarter of the year the company incurred a loss.

Net income for the three months ending June 30 was \$65,606, which will net three cents a share on capital stock, as compared with a loss

of \$561,605 for the first quarter. The second quarter of 1937 netted \$825,453, or 39 cents a share.

Net loss for the six months ending June 30 was \$495,999, against a net income of \$1,631,961, or 78 cents a share, for the first half of 1937. For the 12 months ending June 30, net income was \$127,173, or six cents a share, against \$2,787,892, or \$1.33 a share, for the preceding 12 months.

Canadian Automotive Exports Show Gain in June, 1938

Canadian exports of motor vehicles and parts were valued at \$2,447,898 in June, 1938, an increase of about nine per cent over shipments in May, 1938, but seven per cent under exports in June, 1937, according to the Automotive-Aeronautics Trade Division. Parts accounted for \$222,700 in June, 1938.

June exports of passenger cars totalled 4433 units valued at \$1,675,716, as compared with 3588 units valued at \$1,294,578 in May, 1938, and 4758 units valued at \$1,644,230 in June, 1937. Shipments of passenger cars were divided into the following price classifications (figures for May, 1938, in parenthesis): 4795 units (3049) valued at \$500 or less, 623 (525) \$500 to \$1,000 and 15 (14) over \$1,000.

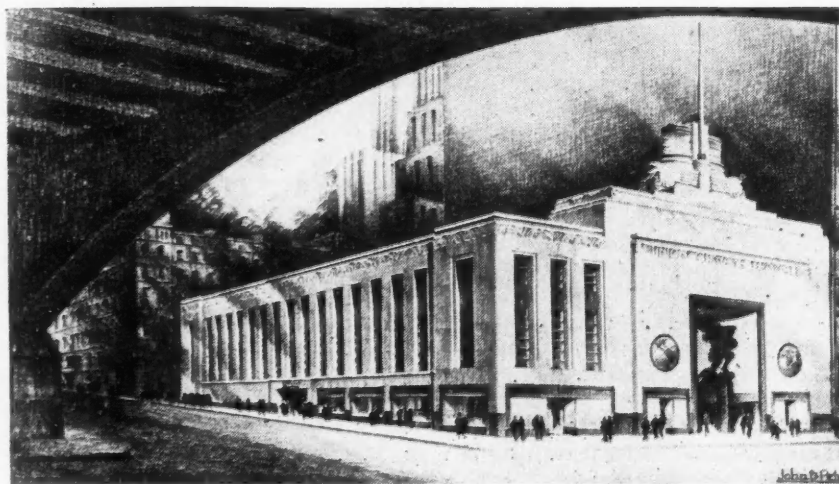
Truck shipments declined to 1362 valued at \$549,484 in June, 1938, from 1665 at \$682,114 in May, 1938, and 2041 at \$699,369 in June, 1937. Exports by capacity follow: 457 units (842) at 1 ton or less capacity and 905 (823) over 1 ton.

During the first half of 1937, passenger car shipments totalled 24,059 valued at \$9,161,202, an increase of four per cent in number over the 23,075 valued at \$8,509,816 in the first six months of 1937. On the other hand, truck exports in the same period decreased by about four per cent, to 10,859 units valued at \$4,354,828 from 11,302 units valued at \$4,168,734. Shipments of parts showed a gain of almost 13 per cent, increasing from \$1,523,215 to \$1,717,023.

Production in the first six months of 1938 numbered 102,158 passenger cars and trucks, of which 34,918 units, or 34 per cent, were exported.

Motor Wheel Report Loss For Second Quarter

A net loss of \$15,039.06 for the second quarter of 1938 was sustained by the Motor Wheel Corp., according to the corporation's quarterly statement. This brought the



AIR TERMINAL proposed for New York. The design was made by John B. Peterkin, architect, who is reported to have filed plans with the Department of Housing and Buildings. Among

the airline companies said to be interested in making the terminal possible are United Airlines, Eastern Airlines, American, Pan-American and Trans-Continental Western Air. Terminal cost is estimated at \$1,000,000.

net loss for the first six months of the year to \$84,454.85, the first quarter loss having totaled \$69,415.79. For the first six months of 1937 the corporation showed a net profit of \$1,154,224.18.

Activities of General Employee Group Stir Tension in Akron

Recent announcement by United Rubber Workers officials that the General Tire & Rubber Co., Akron, would be the focal point of the CIO's next drive for a signed contract intensified activities of the new General Independent Tire Employees Association and has increased tension at the General plant. Aug. 1 two officials of the new Employees Association signed affidavits in the Akron municipal court charging three alleged General URW leaders with having assaulted them as they entered the General plant. The officials signing the affidavit claimed CIO leaders were attempting "to bludgeon all General workers into CIO membership and the paying of dues into that organization."



A legislative review of the three sessions of the seventy-fifth Congress, adjourned June 16, 1938, has been published in pamphlet form and titled "The Retailer and the 75th Congress" by the American Retail Federation, Washington, D. C.

A new line of automatic batching scales is described in the latest bulletin issued by the Buffalo Scale Co., Buffalo, N. Y.*

A special locking rivet claimed to be "the ideal fastener for use in confined spaces, fragile materials, or wherever heating, hammering or upsetting is impractical" is described in a pamphlet published by the Hopkan Rivet Co., Inc., Pittsburgh, Pa.*

"Homo Method for Nitriding" is the title of the Leeds & Northrup Co.'s latest catalog.*

Pawtucket Mfg. Co., Pawtucket, R. I., has prepared a folder describing its new line of standard sizes of Herculoy bolts and nuts.*

"Selection of Fire Apparatus" is the title of a bulletin prepared by the National Board of Fire Underwriters, committee on Fire Prevention and Engineering Standards. It indicates the changing picture in fire fighting due to improvements in the automotive field.*

Complete specifications on bits for driving slotted head and Phillips recess-head screws and on socket wrench shanks and socket wrenches for all types of bolts and nuts are presented in a new catalog issued by the Independent Pneumatic Tool Co.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

BRITISHER

John R. Cobb who arrived this week in New York on the "Aquitania" and immediately left for the Bonneville Salt Flats in Utah where he will attempt to prove that his unconventional racing car designed by Reid Railton is the "fastest thing on wheels."



Cobb Comes to Conquer

(Continued from page 151)

mission, and the rear engine drives the front axle. The engines, parallel to each other, are mounted to the spine of the racer on outriggers, and the propeller shafts enter their respective axles at an angle.

Three carburetors are fitted to each of the 12-cylinder engines, and superchargers turning up 30,000 r.p.m. are used. The Napier engines are cast with three blocks of four cylinders. Plain bearings are used for the connecting rods, and the crankshafts are fitted with roller bearings. Light alloy cylinder blocks are fitted with steel liners, and light alloy pistons are used.

Water-cooled brake drums are augmented with an "air brake," a device of wings, or flaps, which are raised by the driver to retard the car's speed. Vacuum boosters are used for the brakes and the flap.

Between runs the whole body is lifted off the car and wheels are changed. Tires are 44 in. in diameter, have a small cross-section, and practically no tread.

Ice and water—75 gallons of it—are used to cool the engine, doing away with the usual radiator and fan. A truck with a specially-designed draw-bar in front, will be used to start the car.

Out in front, about where one

would see the eyes of some prehistoric monster, is the slightly-elevated driver's cockpit, completely enclosed with a transparent windshield. The driver sits well ahead of the front axle with about 26 feet of the smoothly molded car behind him. The rear end tapers off into a blunt, finless tail. The whole bottom of the car is smoothly shielded, with only the tops and bottoms of the wheels visible. The front wheels have a track of 5 ft. 6 in., and the rear, 4 ft. 6 in., resulting in a remarkably striking streamline design.

About three times as long as wide, and only about half as high at the highest point of the cockpit as wide, this startling vehicle develops one horsepower to every 2.8 lb. of weight, and is counted on by its modest designer and proud owner to break the world's speed record on land. Its power to weight ratio compares with about 5.23 lb. per horsepower of Capt. Eyston's "Thunderbolt," now on the Bonneville Salt Flats waiting for a chance to do better than 311.42 m.p.h., Capt. Eyston's previous record.

Neither Mr. Cobb nor the designer would venture to predict the "Railton's" top speed, but they left New York confident that they have something there.

Original Equipment Tire Market Off About 65 Per Cent

Due to the drastic curtailment in automobile production, with car manufacturers taking only one-third as many original equipment tires in the first half of 1938 as in the same period of 1937, tire production and shipment figures for the first six months are substantially lower than a year ago. In the first half of 1937 car makers took some 14,000,000 original equipment tires, but in the same period of 1938 they took less than 5,000,000. For all of 1937 the original equipment market consumed 22,700,000 tires. The prospects are that the 1938 total figure will not reach 11,000,000.

Total tire shipments for the first half of this year were 18,346,454 casings against 30,991,302 in the same period last year. Production this year was 16,465,721 against 32,562,388 last year.

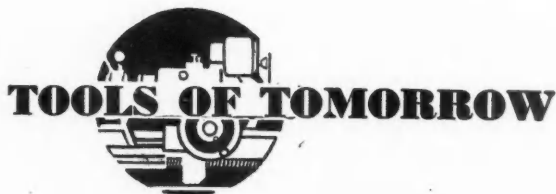
With original equipment figures deleted, it appears that shipments to the consumer market, while under those of a year ago, were favorable. They averaged about 13,850,000 this year against 16,900,000 last year. Dealer stocks are known to be subnormal, indicating that the consumer sales have actually exceeded manufacturers' shipments to dealers.

With crude rubber prices strong (over 16 cents) and with consumer tire buying soaring to its peak this month, the industry confidently expects total renewal sales to exceed 29,000,000 for the year with far better sales in the last six months. As manufacturers have shipped consistently more than they have produced for the last five months, and as inventories are down under 10,000,000 units in contrast to more than 12,500,000 a year ago, the industry confidently expects to see steady gains in employment and production between now and Oct. 1.

I.H.C. Milwaukee Plant Resumes Operations

Milwaukee works of the International Harvester Co., manufacturing various lines of tractors, fuel injectors and other specialties, reopened Aug. 1 after a month's shutdown. Re-employment corresponded to the payroll at the time of the shutdown on June 30, namely, 2700 persons. Normal employment at Milwaukee is 4000, although at the peak the plant had a payroll of 6400 people. E. J. Leiser is general superintendent.

August 6, 1938



Valve Control

... Automatic attachment designed for Sterling "Speed-Bloc" sander

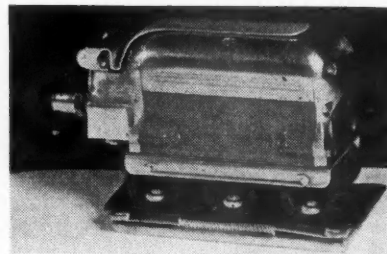
The Sterling Products Co., Detroit, manufacturer of the Sterling "Speed-Bloc" sander, has developed a new automatic valve control which is designed to automatically start and stop the sander and control the flow of water when a hose is attached for wet sanding.

Use of bar stock, aluminum pistons and expander rings mounted behind piston cups in the latest model are reported to have reduced air consumption to approximately 5½ cu. ft. per min. under full load at speeds of 3000 oscillations per minute. Tests conducted by the company are said to indicate that air wasted approximates 15 to 35 per cent of air consumed in the operation of the machine. This waste is claimed to be eliminated through use of the automatic valve control. In addition, it is pointed out that operating efficiency is materially increased as the operator has both hands free to operate the machine and manipulate the product being sanded or rubbed.

Vise Stand

... Equipped with power unit and chuck for threading, cutting, and reaming all sizes of pipe up to 2 in.

A pipe vise stand of the usual type but equipped with a power unit and chuck which enable the user to



Sterling sander with new valve control

thread, cut and ream all sizes of pipe up to 2-in. by power has been developed by the Oster Mfg. Co., Cleveland.

Pipe is gripped in a universal, bar-operated, scroll type chuck and is revolved by the power unit concealed in the upper part of the stand on which the pipe vise is usually mounted.

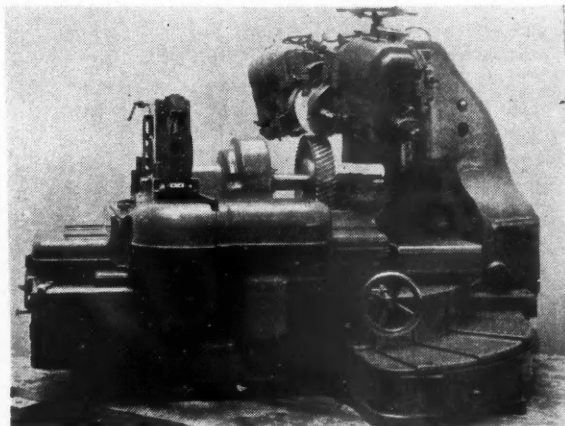
Gear Grinding

... New Maag machine for spur and helical gears placed on American market by Triplex

A Maag helical and spur gear grinding machine of new design by the Maag Gear-Wheel Co., Ltd., Zurich (Switzerland), has been placed on the American market by the Triplex Machine Tool Corp., New York.

Some of the principal characteristics of the machine, which is designated as HSS 60, are as follows: maximum external diameter of gear blank, 23.6 in. for width up to 5.1 in., also 17.3 in. for width up to 9.5 in.; minimum pitch circle diameter

Maag helical and spur gear grinding machine



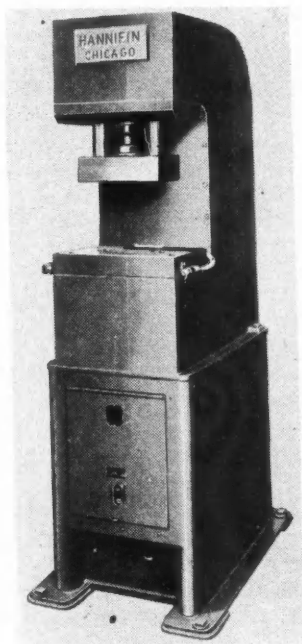
Automotive Industries

of gear blank, 2.5 in.; maximum face width of blank, 5.1 in. when diameter is greater than 17.3 in. and 9.5 in. when diameter is less than 17.3 in.; maximum/minimum pitch of blank, 2/12.5; maximum/minimum number of teeth, 180/10; maximum helix angle, 45 deg.; distance between centers, 16.5 in.; number of possible generating speeds, 2 x 5; number of single generating strokes per minute, 50 to 170; number of possible feeds with the normal change gears, 8; and feed per single generating stroke, 0.0335 in. to 0.185 in.

"Hy-Power" Hydraulic Press

... New Hannifin machines available in capacities from 12½ tons to 60 tons.

For operations such as pressing, forming, crimping, stamping and shallow drawing, the Hannifin Mfg. Co., Chicago, has brought out a new "Hy-Power" hydraulic press. It is



New Hannifin Press

available in capacities ranging from 12½ to 60 tons.

The "Hy-Power" hydraulic operations provide an automatically completed press cycle when the push button control is operated. The cycle includes: 1. rapid advance stroke until the die touches the work; 2. automatic high pressure working stroke; 3. automatic reversal at maximum pressure; and 4. rapid return to starting position. The oil pump idles at zero pressure between cycles.

Automotive Industries

Will Analyze Manufacturers' Marketing Methods

Formation of Marketing Associates, Inc., has been announced by Ralph Voorhees, president. Services to be offered by the new organization are reported to include marketing and merchandising analysis and research to determine "the proper sales methods and policies that should be used by any given manufacturer in any industry." The company will conduct its own "laboratory" and offer manufacturers the facilities of a national distribution division as a means to reducing direct selling expense.

Other officers of the company include A. F. Grigg, vice-president, in charge of the distribution service, and J. W. Howe, secretary and treasurer. The principal office is located in Newark, N. J.

Anticipates Better Business for Automotive Parts Plants

Much better business for automobile parts plants in the last quarter of 1938 has been forecast by Royce G. Martin, president of Electric Auto-Lite Co.

Mr. Martin reported the company

has renewals of all its contracts for parts and equipment for the 1939 car year and some additional business. Government orders for batteries are an additional source of business in that field.

A net loss of \$183,656 was reported for the first half of 1938. Inventories were reduced by \$4,293,246, or 38 per cent. The company reported cash \$6,691,880 as of June 30 as contrasted with \$2,706,038 at the close of 1937. Current assets were \$5.43 to the dollar of current liabilities.

Stevens Starts Graduate Work In Evening Courses

Stevens Institute of Technology is offering for the first time during the academic year 1938-1939 a program of evening graduate courses. Coordinated groups of related courses are to be given in the fields of Mechanical Engineering, Electrical Engineering (specializing in communication), and Economics of Engineering. With the exception of a few noncredit courses, each course carries credit in one or more approved programs leading to the degree of Master of Science.



Italy's Aircraft-Engine Industry

In Italy there are five large manufacturers of aircraft engines, of which three—Fiat, Isotta-Fraschini and Alfa-Romeo—already possess an international reputation. Fiat has been manufacturing aircraft engines since 1903. At the present time the firm is concentrating on two double-row radial types, of 890 and 1200 hp. respectively, while in-line engines are being built up to 1000 hp. The firm claims credit for having produced the most powerful aircraft engine ever built, the double AS 6 engine developing 3100 hp. (two V engines mounted end to end), which holds the speed record of 441 m.p.h. Fiat also manufactures Hamilton propellers under license. The plant has a wind tunnel which is quite out of the ordinary by reason of its dimensions and its technical possibilities.

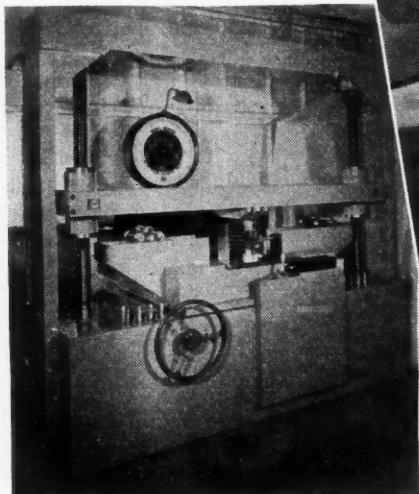
Isotta-Fraschini, which built the first Italian aircraft engine of 1000 hp., has long confined itself to Vee

type water-cooled engines. At the present time the firm also builds radial-type Astro engines in 7- and 14-cylinder models, and has also been working on V-type air-cooled engines in powers up to 700 hp.

Alfa-Romeo entered the aircraft-engine field in 1917 and built about 1000 engines under license. Later it developed designs of its own, and one of its latest types is a 14-cylinder radial derived from the 126 model, which in turn preceded the Pegasus built under license.

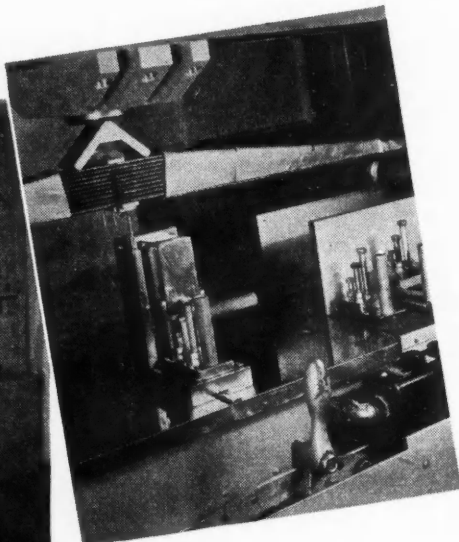
The Compania Nazionale Aeronautica manufactures only low-powered engines designed for use in sport planes, while the Piaggio firm, whose plant at Genoa has been building planes since 1916, started out by building engines under license (particularly the Jupiter), but has lately developed its own two-row radial 14-cylinder engine for use in altitude flying, which develops 710 hp. at 23,500 ft.—*Technique Moderne*, July 15.

August 6, 1938



SUSPENSION SPRING

characteristics can be measured on this machine ten times more precisely than was before commercially possible,



according to Chrysler engineers who just completed the testing device in the corporation's research laboratory. Details of the apparatus are presented in the article on this page.

Chrysler Builds New Spring Tester

*Machine for Investigating Suspension Spring Characteristics
Said to be Most Accurate in Automobile Industry*

What is said to be the most accurate suspension spring testing apparatus in the automobile industry measuring ten times more precisely than was before commercially possible, has just been completed by engineers in the Research Laboratories of the Chrysler Corp.

According to Tore Franzen, the corporation's chief spring engineer, "the construction of this machine became necessary as the ever-increasing softness of suspension springs demanded a higher degree of accuracy in measuring spring rates and loads. Errors of five to ten pounds in either characteristic may have a marked effect on the riding quality or appearance of a car having suspension rates at or below 100 pounds per inch. Yet the load testing machines in spring shops, car assembly plants and engineering laboratories have had limits of error even in excess of ten pounds."

The framework of the machine is built of standard structural steel shapes which, together with the driving mechanism, are covered with sheet metal panels for appearance and safety. The superstructure built on the scale platform transfers the load to the corners of the platform directly over the supporting knife edges. Tracks are provided for the leaf spring trucks in which a variety of pins and spacers automatically centers the leaf springs of

any specified width and eye diameter. The coil springs and the control switch pedestal are mounted on a centrally located heavy steel plate.

The driving and loading mechanism consists of two screws at opposite ends of the leaf spring track which carry and drive the loading beams and head through bronze nuts set in iron castings, thus leaving an unobstructed view of the scale dial through the center of the machine. The thrust load is taken by ball bearings at the lower ends of the screws. The screws are driven through bevel gears by a countershaft which is in turn driven by a 7½-hp. direct current motor through a speed reducer and chain. The motor to screw speed reduction is 30:1, and the normal linear speed of the loading head is about three feet per minute.

A taring device is operated by a conveniently located handwheel. It has a capacity of 50 lb. which is more than the variation between the weights of our lightest and heaviest passenger car springs. Thus, the scale dial can be set to zero after any spring is placed on the platform and before the test is begun.

The scale dial is graduated from zero to 1000 lb. in one pound divisions and hence can be read to at least one-half pound. Additional capacity is available in 500 to 1000 lb. increments up to a total of 4000

lb. The amount added is registered at the bottom of the dial and is controlled by a handle at the front of the machine. The tare beams can be adjusted to provide 1250 lb. more capacity, thus making 5250 lb. the maximum load which can be registered.

A so-called "vacuum contact tube" was found to possess suitable qualifications for interrupting the current for the electric driving motor and thereby stopping the load-applying mechanism when the spring is compressed to the exact specified weight. This is a mechanically simple single pole, double throw switch. Its contacts are sealed within an evacuated can and are actuated by a force of not more than 70 grams which will not affect the dial reading. The extreme end of the operating arm moves only 0.070 in. from one contact position to the other so that the switch can be expected to function repeatedly with a variation in operating arm position of not more than plus or minus 0.003 in. There are two of these switches, one to slow down the motor to about one-tenth of its normal speed and the second to stop and brake the motor when exactly the desired spring height has been reached. They are mounted in a case which is supported on a pedestal so that it can be easily fixed at various heights above the scale platform to correspond with the specified spring heights. The switch push rod extending upward from the case engages a clamp placed around the leaf spring at the center bolt. In the case of a coil spring the switch push rod engages the loading head directly.

A five-button push button control station is provided. One button is a "Forward" control which causes the loading head to move downward, engaging and compressing the spring until the automatic switch assembly is actuated at which time the motor is first slowed down and then brought to an almost instantaneous stop by dynamic braking. The second push button is a "Reverse" control which causes the loading head to rise to the upper limits of its travel where it is brought to rest by a limit switch. A "Stop" button is provided which can be used to arrest either upward or downward travel of the head at any point. The two remaining buttons are "Jog Forward" and "Jog Reverse." These cause the machine to creep at one-tenth normal speed only as long as the buttons are depressed. Thus a means is available for bringing springs to heights other than those provided for by the various positions

at which the automatic switch may be set. The jog control is sufficiently delicate to make unnecessary any provisions for operating the machine with manual power.

Two other limit switches are provided. One of these stops the machine as soon as the dial point goes off scale. This prevents damage to the scale mechanism and also serves as an automatic stop when bulldozing coil springs with a given load. The other makes the machine totally inoperative whenever the dial pointer is located at zero. This is an important safety measure to prevent accidental overloading of any part of the machine.

Studebaker Loss at \$868,008 For Second Quarter of '38

Studebaker Corp.'s financial statement issued for the second quarter and first six months ended June 30, 1938, shows a net loss for the quarter of \$868,008.66 and \$1,940,360.38 for the six months.

The corporation reported net sales for the second quarter at \$8,787,521.31 and, for the six months, net sales aggregating \$17,493,033.03.

PWA Approves Super-Highway Project for Pennsylvania

A four-lane super-highway of the type which some Congressional enthusiasts would like to see running from Maine to California is assured in Pennsylvania under a \$26,000,000 outright grant approved by the PWA and a \$32,000,000 loan from the RFC. The new road will connect Harrisburg and Pittsburgh, 162 miles apart, and will be the first sizable toll road to be constructed in the country.

The PWA announcement called the project "one of the most spectacular highway projects in the country, and said that it will be designed to avoid the sharp curves and steep grades of the existing routes through the Alleghenies. Construction will be subject to the joint supervision of the PWA, the RFC and the Pennsylvania Turnpike Commission. Tolls will be fixed at a rate to repay the RFC loan.

The road will follow a straight course laid out in 1881 by the South Pennsylvania Railroad, which later was forced to abandon its energetic plan, and will include nine tunnels, some of which are a mile in length. Safety devices of the most modern type will be utilized for the turnpike and traffic will be separated

according to types of vehicles. Clover-leaves, designed to avoid the necessity of breaking the road at intersections, are expected to adequately provide for entrance and exit facilities.

It has been described by the Pennsylvania Turnpike Commission as "an all-weather highway" since the slight grades and easy curves, the protected tunnels and the divided lane arrangements are

Calendar of Coming Events

CONVENTIONS AND MEETINGS

National Petroleum Association Meeting, Atlantic City, N. J.	Sept. 14-16
Seventh International Management Congress, Washington	Sept. 19-23
SAE National Regional Fuel and Lubricants Meeting, Tulsa, Okla.	Oct. 6-7
SAE National Aircraft Production Meeting, Los Angeles, Calif.	Oct. 13-15
American Welding Society Meeting, Detroit	Oct. 17-21
SAE Annual Dinner, New York	Nov. 14
SAE National Transportation Engineering Meeting, New York	Nov. 14-16
National Safety Council Meeting, Chicago	Nov. 14-18
American Petroleum Institute Meeting, Chicago	Nov. 14-18
National Industrial Traffic League Meeting, New York	Nov. 17-18
Automotive Service Industries Show, Chicago	Dec. 5-10
*National Standard Parts Association Meeting, Chicago	Dec. 2-3
SAE Annual Meeting, Detroit	Jan. 9-13

SHOWS

New York, National Motor Truck Show,	Nov. 11-17
New York, National Automobile Show,	Nov. 11-18
Pittsburgh, Pa., Automobile Show,	Nov. 11-18
Detroit, Mich., Automobile Show,	Nov. 11-19
Columbus, Ohio, Automobile Show,	Nov. 12-18
Buffalo, N. Y., Automobile Show	Nov. 12-19
Chicago, Ill., Automobile Show	Nov. 12-19
Milwaukee, Wis., Automobile Show,	Nov. 12-19
Minneapolis, Minn., Automobile Show,	Nov. 12-19
*Philadelphia, Pa., Automobile Show,	Nov. 12-19
*San Francisco, Calif., Automobile Show	Nov. 12-19
Boston, Mass., Automobile Show,	Nov. 12-19
Los Angeles, Calif., Automobile Show,	Nov. 12-20
*St. Louis, Mo., Automobile Show,	Nov. 12-20
*Elmira, N. Y., Automobile Show,	Nov. 14-19
New Haven, Conn., Automobile Show,	Nov. 14-19
Indianapolis, Ind., Automobile Show,	Nov. 19-25
Baltimore, Md., Automobile Show,	Nov. 19-26
Rochester, N. Y., Automobile Show,	Nov. 19-26
Montreal, Canada, Automobile Show,	Nov. 19-26
*Washington, D. C., Automobile Show,	Nov. 19-26
*Cincinnati, Ohio, Automobile Show,	Nov. 20-26
Newark, N. J., Automobile Show,	Nov. 26-Dec. 3
Denver, Colo., Automobile Show,	Dec. 5-10

*Tentative

Goodyear Employees Association To Seek NLRB Election

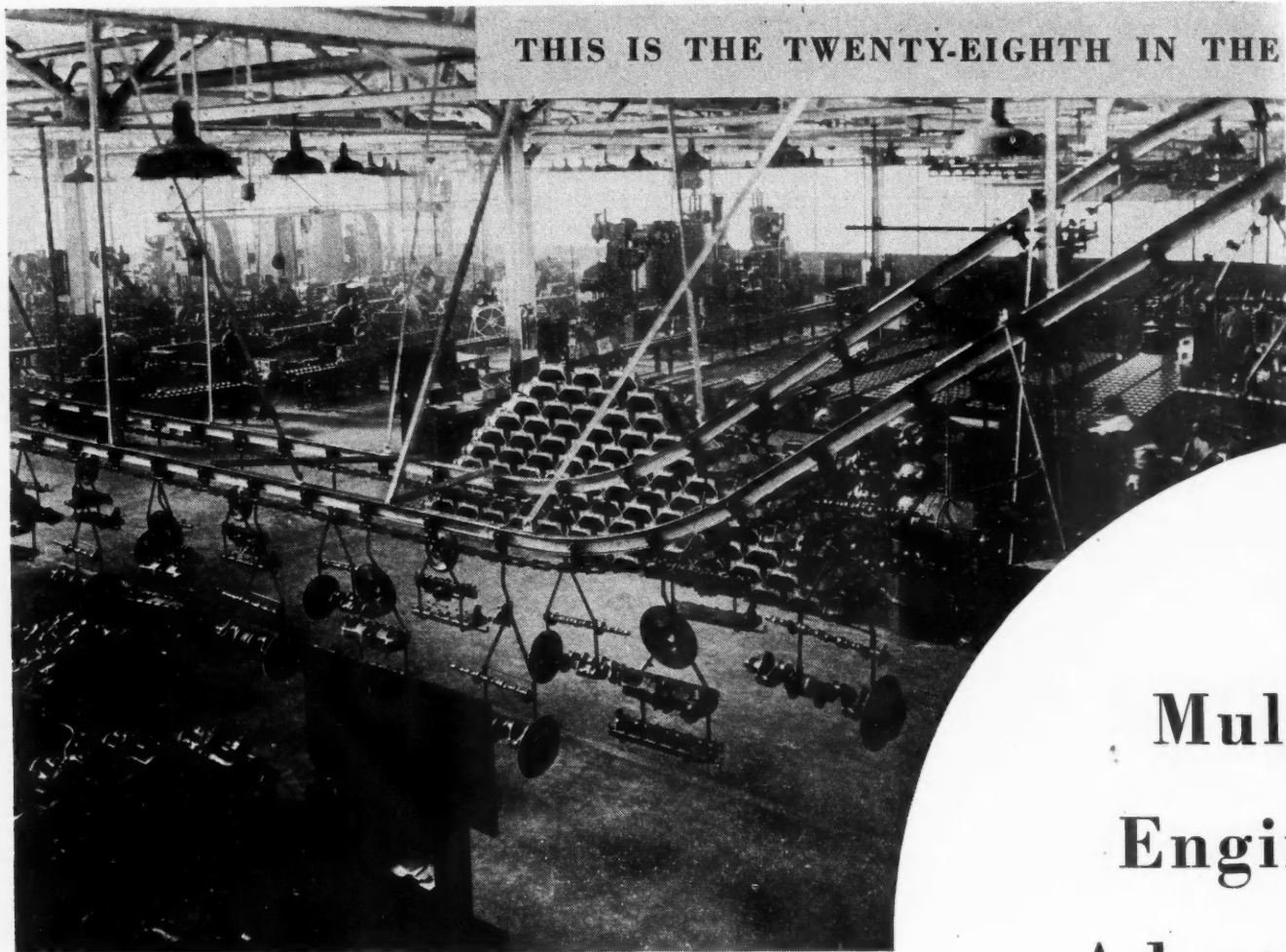
Claiming more than 4000 signers to its petitions, the new Independent Employees Association at the Goodyear Tire & Rubber Co., in Akron, has announced that it will be ready Aug. 9 to submit its petitions to the National Labor Relations Board for a new collective bargaining election at Goodyear with its name on the ballot in competition with the United Rubber Workers Union of the CIO. Goodyear's recent layoff program involving between 1200 and 1700 Akron employees is said to have strengthened the claim of the new group that it now represents a majority. Last August the CIO won collective bargaining rights by a vote of 8464 to 3193.

Meanwhile the URW continues to press its drive for a signed contract with Goodyear. Observers say indications are the matter of a contract with the CIO will be held in abeyance pending a test between the CIO and the new group to determine which represents the majority. If the CIO should lose its collective bargaining rights, the company probably would enter into its contract negotiations with the new group immediately, it is said.

U. S. Tire Exports Higher in 1938

While tire exports of its chief competitors in world trade declined in the first five months of 1938 as compared to 1937, tire exports of the United States show a substantial increase. In the first five months of 1937 the U. S. exported 428,000 tires and increased this figure to 438,000 for the same period of 1938. United Kingdom exports declined from 574,000 last year (five months) to 481,000 this year. Canadian exports dropped from 399,000 to 287,000.

If the United States can hold its rate of gain for the balance of the year, it will wrest leadership from the United Kingdom. For all of 1937 U. S. exports were 1,016,000 casings, compared with 1,376,000 for the United Kingdom, 863,000 for Canada, 474,000 for France, 471,000 for Italy, 251,000 for Germany, 193,000 for Japan and 431,000 for Belgium.



THIS IS THE TWENTY-EIGHTH IN THE

Majestic sweep of overhead conveyor lines is characteristic of the materials handling system in the plant

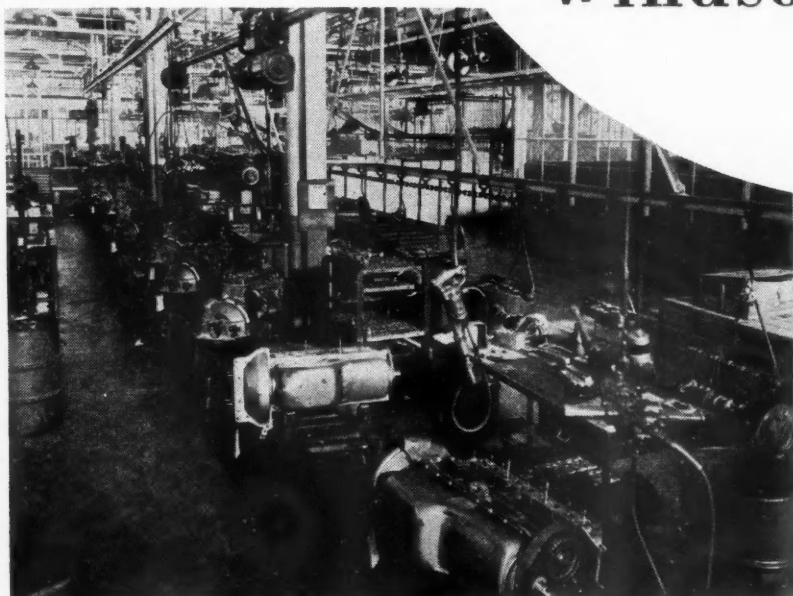
Multi-M
Engine A
Adapted to

Production at Windsor, O

By JOSEPH GESCHELIN

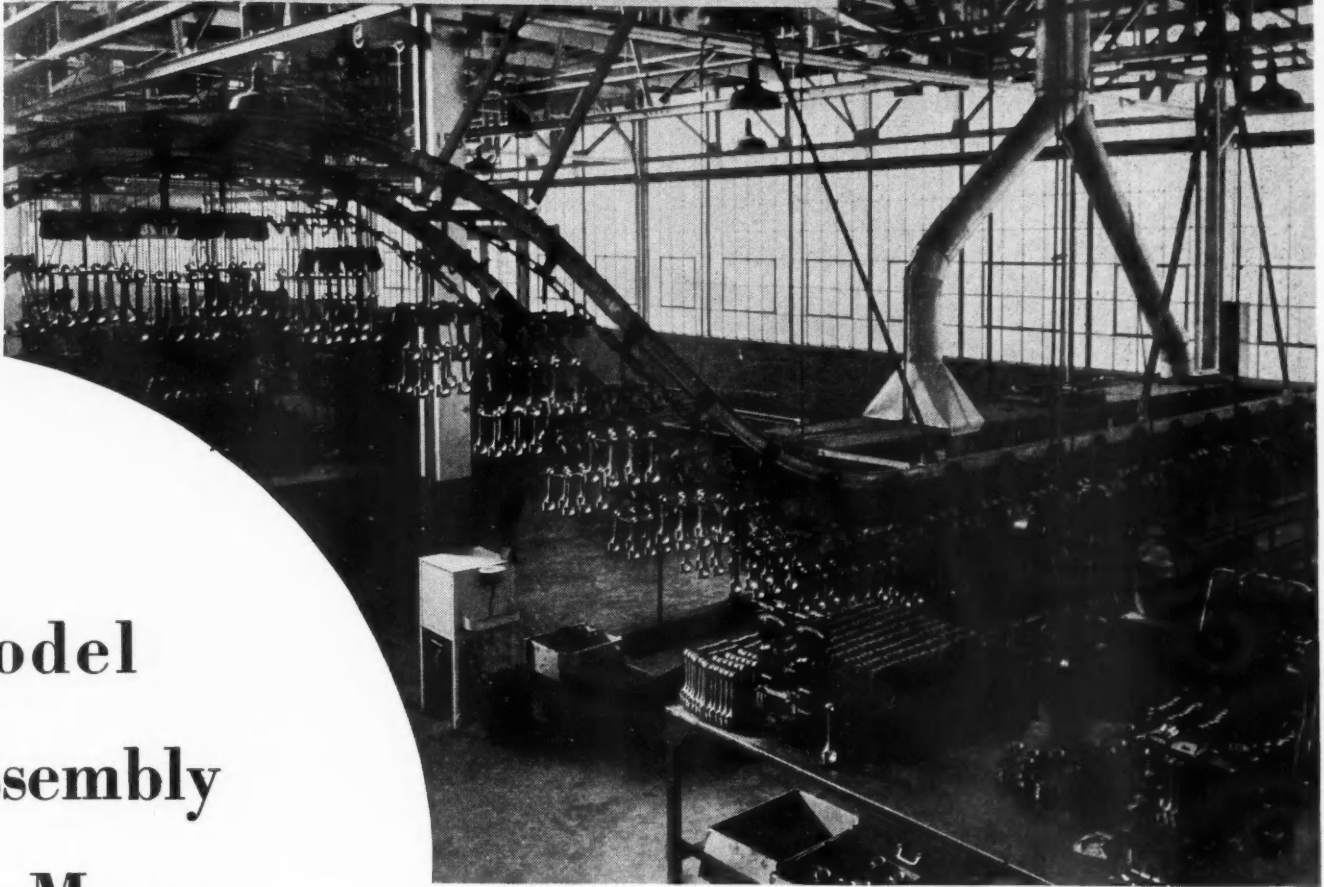
FAVORED by a generous acceptance of its product in the Canadian market, the Chrysler Corporation of Canada, Ltd., with headquarters in Windsor, Ontario, broke ground some six months ago for a new \$3,000,000 engine manufacturing plant which is now in full operation. The plant is tooled for an output of 200 units a day with a payroll of around 500 men.

The Canadian organization builds a complete line of six-cylinder Chrysler, Plymouth, Dodge, and DeSoto cars; Dodge and Fargo trucks in a full range of capacities; and a com-



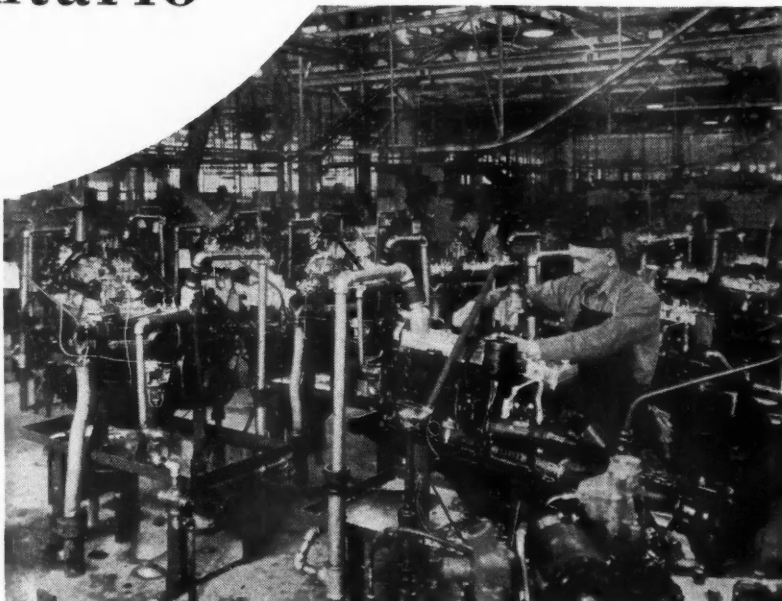
Power-driven engine final assembly line is served by high-cycle portable tools. Note various positions of the engine depending upon stage of assembly

SERIES OF MONTHLY PRODUCTION FEATURES



Short, closed conveyor loop connects final machine and wash with distribution to stones. Connecting rod and piston sets are matched and sent through the Blakeslee washing machine at the right, prior to distribution to assembly

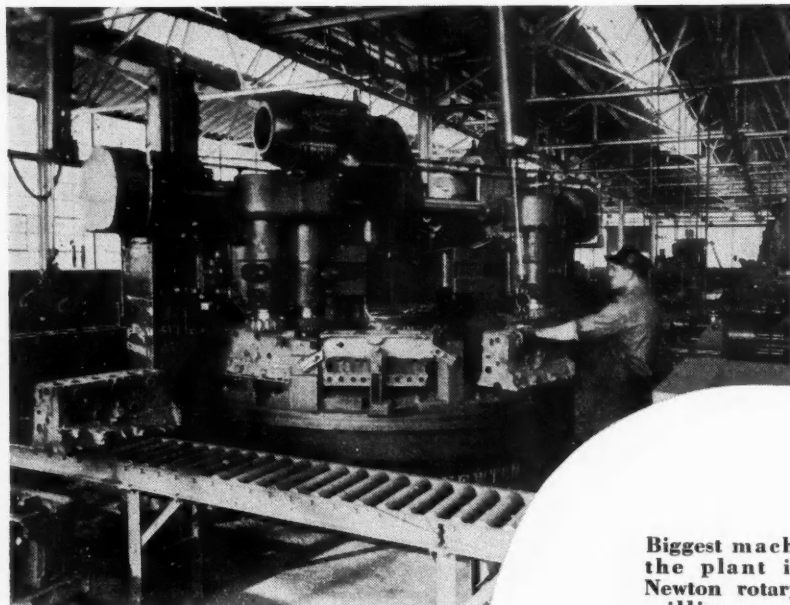
Model e Assembly d to Mass t Chrysler Plant, r, Ontario



plete line of commercial models. The outstanding feature of the engine plant is that in the interest of better service to the public as well as for greatest facility in the production set-up, engine design incorporates the maximum of interchangeability as between the major elements of all engines in the line.

Specifically, they build four, six-cylinder engines combined with a variety of seven different heads. The engines range in capacity—201.3, 218, 228, and 241.5 cu. in., respectively, with corresponding horsepower rating. Interchangeability is effected by holding all dimensions

Every Chrysler engine coming off the assembly line is run in for two hours in the test stand department shown here



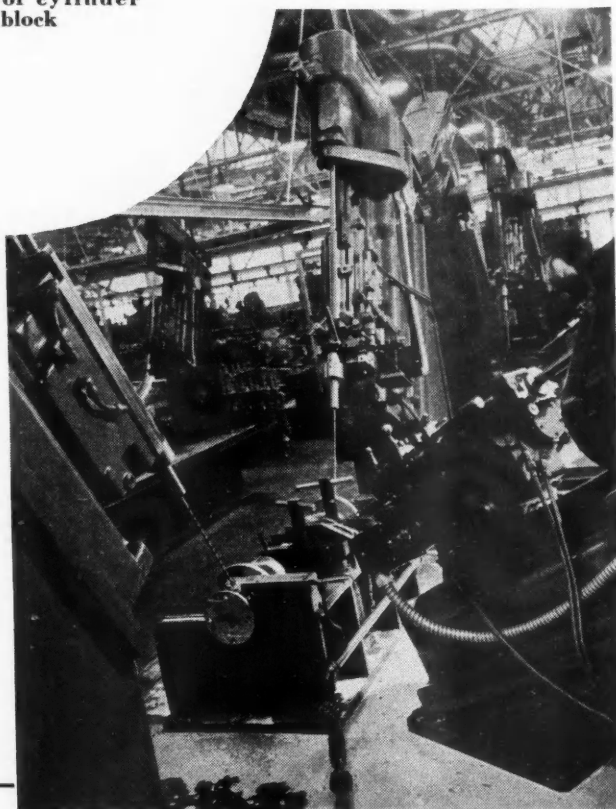
Biggest machine in the plant is this Newton rotary table milling machine used to rough and finish-mill top and bottom of cylinder block

constant save the stroke. This means that the only variation between engines of different capacity is in the connecting rods and crankshafts—of which there are four sizes corresponding to the four engine models.

Consequently, this coordination of engineering design and production planning made it possible to create a mass production set-up comparable in layout and mechanization to any engine plant in the automotive field. This arises from the fact that the major parts—cylinder blocks, pistons, flywheels and flywheel housings, manifolds, bearings, etc., all are interchangeable.

Known as Windsor Plant No. 2, the engine plant is housed in a modern single-story monitor type building with a high ceiling and extraordinary provisions for better seeing by virtue of window glass occupying

Interesting view of the group of Aveymatic precision drilling machines set up for drilling crankshaft oil leads



Factory Personnel

K. Crittenden	Vice President and Operating Manager
R. S. Bridges	Assistant to Operating Manager
L. L. Roberts	Superintendent
K. F. Brooks	Plant Engineer and Master Mechanic
H. L. Miller	Planning Superintendent
W. T. Dunlop	Chief Inspector
W. S. Dawson	Tool Engineer
R. H. Good	Planning Supervisor Plant No. 2

over 80 per cent of total wall and roof space. It is built on a six-and-three-quarter acre plot and has a floor space of 124,800 sq. ft.

Ample evidence of the care taken to assure the best possible working conditions is found at every turn. The entire building right down to each individual working station is flooded with daylight. The large floor area, under a single roof, has excellent ventilation. Clean comfortable wash rooms and lockers are located on overhead galleries. Generous use of glare-absorbing aluminum paint makes for cheerful surroundings.

Above all, however, there is a normal and unhurried tempo of ac-

tivity on the machines and assembly lines that connotes comfortable working conditions without the fatigue usually attributed by the layman to mass-production.

In many ways, the management has been able to take advantage of the latest developments in plant layout and mechanization. Not obvious to the casual visitor, but nonetheless of vital importance is the use of the

bus duct system of power distribution to production equipment. Bus duct lines are installed overhead and traverse the principal machinery lines. Frequently spaced outlets facilitate the plugging-in of machines at any convenient point and permit the relocation of single machines or entire departments without disturbing the wiring in any way.

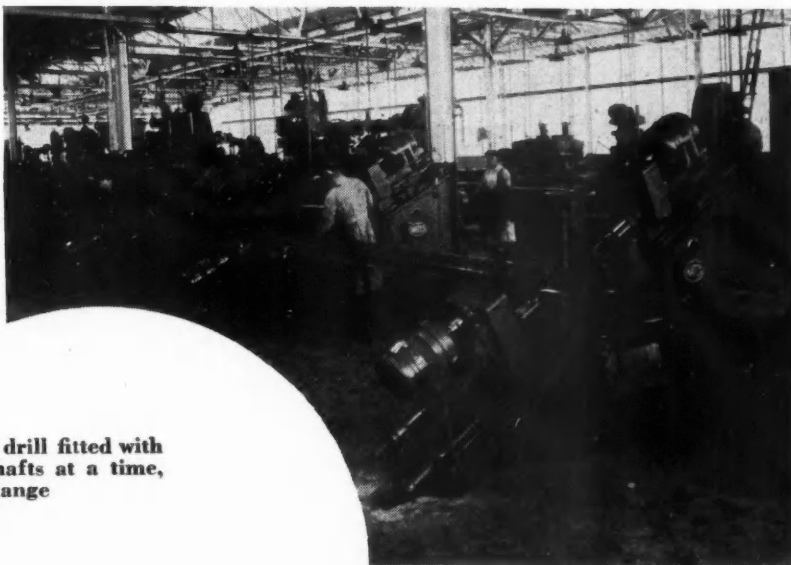
Materials handling has been completely mechanized so as to relieve the workers of arduous hand labor and at the same time to facilitate the smooth flow of materials. Every variety of materials handling device known to the art is found here—gracefully arching overhead monorail conveyors reminiscent of the Plymouth plant in Detroit, electric hoists, gravity roll conveyors for the machine lines, platform assembly line conveyors, air cylinder hoists, and the like.

Profiting by an important discovery made by Chrysler in Detroit, all of the machinery installed here is set up without the use of foundation bolts or foundation pits. Each machine is set in place on a sheet of roofing paper treated on both sides with mastic which apparently vulcanizes under pressure and holds the machine securely in place. This procedure has many advantages. It cuts the first cost of machinery erection; it preserves the floor; and

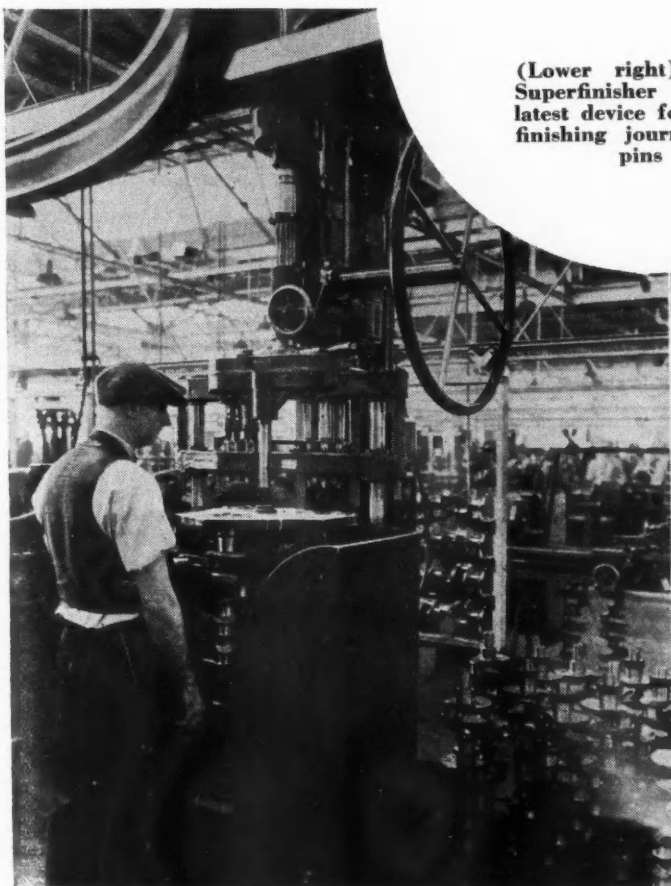
makes it possible to shift machines at will without the usual necessity of patching the old foundation while ruining a new section of the floor. But apart from these obvious advantages, the method produces a resilient, though thin, cushion which absorbs machinery vibration to a remarkable degree.

With this background of the physical plant, let us turn to the attitude of the organization with respect to consumer relations. Even a cursory

(Top) Battery of three Natco two-way drilling machines for finishing angular cylinder block holes. Each machine is fully automatic in operation



(Lower left) Huge, heavy-duty Baker drill fitted with vertical fixture holding three crankshafts at a time, drills and reams holes in flange



(Lower right) Foster Superfinisher is the latest device for super-finishing journals and pins



trip through the various departments reveals the dominating role of quality control. From our own experience we were impressed with the fact that quality control in this plant vies with any thing that may be found in the most progressive plants in this industry.

Consider, for example, that every engine is run in on the test stand for two hours. That in itself is not

exceptional but the fact that all engines are tested 100 per cent on the dynamometer—preserving a record of performance of each engine—is noteworthy. The combustion chamber volume of each cylinder head—and they have seven different heads in the line—is checked 100 per cent. Apart from other inspection tests the camshafts are checked 100 per cent on the Pratt & Whitney

Camshaft Comparator for all dimensions.

Engine cylinders are double-honed and gaged at each operation. Flywheels are balanced twice—once during machining, and again before attachment to the crankshaft. Crankshafts are tested for balance at three different stages—dynamically on a new Olsen-Lundgren machine directly after machining, then tested for

Factory Routing Cylinder Block

OPERATION	EQUIPMENT	OPERATION	EQUIPMENT
Inspect casting	Type 30 Brinell hardness testing machine	Counterbore underside of valve stem guide holes	Natco No. 2 AL Hole-steel drilling machine with 6-spindle head. Equipment with special slide to feed cutters upward hydraulically
Spray sealer paint. Dry in oven at 150 deg. Fahr.	Booth for paint spray. DeVilbiss pressure tank 10 gal. capacity	Rough ream valve guide and tappet holes and semi-finish form throats of intake and exhaust ports.	Foote-Burt No. 15½ drilling machine
Rough and finish mill top and bottom	Newton V-4 rotary continuous type milling machine	Semi-finish ream valve guide and tappet holes. Semi-finish ream intake ports and finish ream exhaust ports	Foote-Burt No. 15½ drilling machine
Drill, ream, chamfer (2) locating holes	Overhead electric hoist and crane	Drill angle oil holes in valve tappet bosses and semi-finish counterbore exhaust insert diameter and finish to depth	Bausch special No. 5 2-way unit type drilling machine with 1-way 30 deg. angular unit
Rough bore cylinder bores	No. 15½ Foote-Burt	Finish line ream (12) valve guide and tappet holes and countersink top of valve tappet holes	Edlund 1-A single spindle
Rough mill front and rear ends	Fitchburg vertical hydraulic 6-spindle boring machine	Burnish (12) valve tappet holes	Edlund No. 4-B single spindle drilling machine
Mill manifold and valve cover face (2 at a time)	Fitchburg Duplex horizontal milling machine	Semi-finish bore cylinder bores	Fitchburg vertical hydraulic 6-spindle boring machine
Finish straddle mill crankshaft bearings and bearing lock slots, etc.	Fitchburg Simplex horizontal milling machine	Chamfer top and bottom of cylinder bores	Natco 2BH-83 vertical Holesteel. drilling machine hydraulic feed
Mill generator bracket bosses; mill regular distributor boss and distributor lock screw boss; mill oil pressure relief boss and mill clutch housing pan bosses	Newton C-74-A rise and fall milling machine	Chamfer tapped holes in top	On conveyor ACC Thor hicycle drill 20B Thor balancer
Water test	Cincinnati 48 in. automatic milling machine equipment with special 3-spindle Snyder milling head	Chamfer tapped holes in front and rear end	Conveyor ACC Thor hicycle drill 20B Thor balancer
Broach bearing lock seats to width and broach depth. Broach crank bearing half round diameter		Chamfer tapped holes in bottom	On conveyor ACC Thor hicycle drill 20B Thor balancer
Drill oil gallery hole from both ends of block (2 blocks at a time)	W. F. & John Barnes No. 420 unit type horizontal two way drilling machine	Inspect all holes before tapping for depth, diameter and number	
Core drill 6 intake and exhaust port throats	Foote-Burt No. 15½ drilling machine	Turn over on conveyor and hand chamfer 12 valve tappet holes from bottom	On conveyor
Drill in top 29 holes	Fox No. 27 vertical hydraulic drilling machine	Tap 33 holes in bottom	Fox No. 27 vertical taper
Drill in top 26 holes	Fox K-60-H hydraulic vertical drilling machine	Tap 22 holes in top	Fox No. 27 vertical taper
Drill in bottom 30 holes	Fox K-50-H hydraulic drilling machine	Tap 22 holes in manifold side	Fox 1-way horizontal taper
Drill in bottom 20 holes	Fox 27 vertical drilling machine — 29-spindle head	Tap 18 holes in front end	Fox 1-way horizontal taper
Drill in manifold side	Fox 1-way horizontal drilling machine — 24-spindle head	Tap 10 holes in oil filler side	Fox 1-way horizontal taper
Drill in manifold side 10 holes	Fox 1-way horizontal drilling machine	Tap 6 holes in rear end	Fox 1-way horizontal taper
Drill in front end 17 holes	Fox 1-way horizontal drilling machine	Drill 1 29/64 in. hole and tap for ½ in. pipe	Edlund Model No. 3B, 2-spindle drill
Core drill Nos. 1-2-3 camshaft holes, counterbore Welsh plug hole	Fox 1-way horizontal drilling machine — 4-spindle head	Blow chips from tapped holes and water passages	Booth with chip catcher
Drill in oil filler side 10 holes	Fox 1-way horizontal drilling machine	Wash block and blow off	Tank and booth. Overhead hoist
Drill in oil filler side 10 holes	Fox 1-way horizontal drilling machine	Assemble 5 Welch plugs	
Drill in rear end 14 holes	Fox 1-way horizontal drilling machine	Water test	
		Inspect all reamed and tapped holes	

Factory Routing Piston

OPERATION

Bore, face and chamfer open end, center head end
Rough turn outside diameter rough turn grooves and rough face head end. Chamfer and form ring lands. Finish cam turn outside diameter of skirt, face, head end, and finish grooves

Core drill, ream and cut lock wire groove and chamfer

Auxiliary equipment for cutting lock wire groove and chamfer wrist pin hole
Drill 15 holes

Saw 3/32 in. wide slot in No. 4 ring groove

Saw 2 slots 1/16 in. wide lengthwise to connect pairs of 7/32 in. holes

Burr saw slots and oil holes
Weigh, machine correction and check to 495 grams plus or minus 2 grams
Re-center open end

Cam grind outside diameter and burr edge of open end
Wash and blow off
Inspect before plating
Load on racks and anodic plate

Run through temperature control unit

EQUIPMENT

Sundstrand 8 in. automatic stub lathe

Fay 8 in. x 21 automatic lathe

Avey special horizontal 4-spindle 2 way drilling machine

Bradford "O" reaming unit with built in 25 cycle motor

Buhr semi-automatic piston drilling machine

Kent-Owens No. 1 plain milling machine

Kent-Owens No. 1 plain milling machine

Bench Snyder special mill equipped with Exact-Weight scale

Special Chrysler recentering unit

Norton 10 x 18 in. type C grinding machine

Stevens full automatic plating machine Model "B"

OPERATION

Stamp size A-B-C-D or E as shown by crayon mark on head of piston

Rough and finish diamond bore piston pin hole (3 pistons at a time)

Remove center boss from head end

Hang on overhead conveyor running through washing machine for hot rinse and blow off

EQUIPMENT

Martin No. 12 hydraulic marking machine

Ex-Cell-O No. 1212 double end 6-spindle diamond boring machine

Leland-Gifford No. 2 14 in. single spindle drilling machine

Blakeslee double tank pump type monorail—wash, rinse and blow off machine also used for final wash of connecting rod assembly.

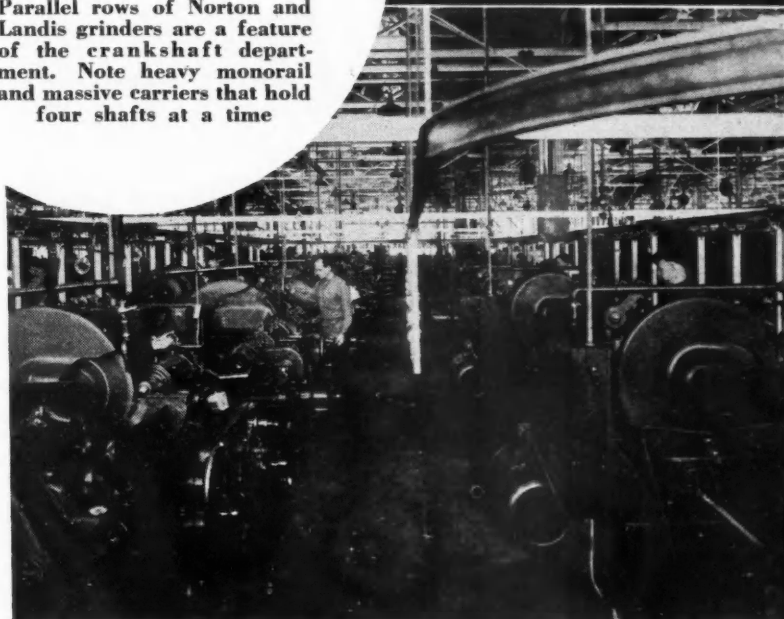


Sheffield precision gage is used for inspection of pistons and classification into standard sizes to facilitate selective assembly

dynamic balance on another Olsen machine after the initial correction for balance, then tested a third time for static balance. Another example of consumer protection is found in the provisions for alignment of the clutch housing. After both the cylinder block and clutch housing have been completely machined and inspected, precise alignment of the two with respect to the crankshaft bearings is assured by supplementary steps. The clutch housing first is fastened to the block, then its outer face is milled square with the bearings by lining up with a massive bar. The assembly then is taken to a boring machine where the outer bore, in the milled face, is re-bored in line with the main bearings.

Generally speaking, this plant is tooled up to produce all of the major parts for the four engines. Although there is no physical separation of departments by partitions or other means, the productive space is nevertheless divided into specific budget centers. Among these are the following: cylinder block; crankshaft; camshaft; connecting rod; piston; flywheel; manifolds; cylinder heads, and miscellaneous parts.

Parallel rows of Norton and Landis grinders are a feature of the crankshaft department. Note heavy monorail and massive carriers that hold four shafts at a time



Factory Routing Crankshaft

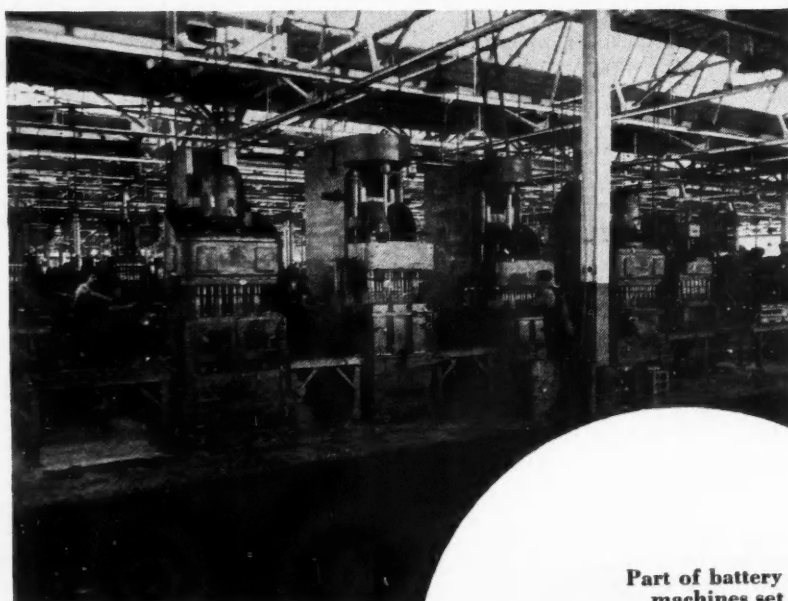
OPERATION	EQUIPMENT	OPERATION	EQUIPMENT
Center both ends	Sundstrand No. 56 heavy duty drilling and centering machine	Finish grind No. 4 (rear bearing) diameter	10 x 36 in. Norton type "C" semi-automatic grinding machine
Inspect and straighten when necessary	General Manufacturing Company press	Finish grind No. 1 (front) bearing diameter	10 x 36 in. Norton type "C" semi-automatic grinding machine
Mill locating spots on No. 1 & No. 6	Cincinnati No. 34/48 hydrodynamic milling machine	Finish grind oil slinger groove	14 in. Norton Model 81-B grinder
Rough turn main bearings—Fan drive pulley and sprocket diameter and flywheel flange diameter	LeBlond 7 ACL automatic lathe	Finish grind gear fit and fan pulley diameter	14 in. Norton Model 81-B grinder
Straighten	General straightening press No. 203—20 ton	Finish grind flywheel face of flange	14 in. 81-B Norton grinder
Finish turn main bearings. Fan drive pulley	LeBlond 4-station drum type automatic line bearing finish turning machine	Finish grind all pin bearings	16 x 42 in. Landis type "D" hydraulic crank pin grinder
Rough and finish turn and cheek all pin bearings	LeBlond 6 AC automatic 2 spindle crankshaft lathe	Drill and ream bolt holes in flange	Baker No. 121-S spindle equipment with Snyder 8-spindle head
Straighten	General No. 203—20 ton straightening press	Mill No. A Woodruff keyslot and straighten	No. 2H Milwaukee 24 in. semi-automatic milling machine
Drill angle oil holes in No. 2-4-5 pins	No. 1 Aveydraulic 3 spindle locked piston type hydraulic feed deep hole crankshaft drilling machine	Dynamic balance	No. 2-S Olsen-Lundgren special dynamic balancing machine
Drill angle oil holes in No. 1-3-6 pins	No. 1 Aveydraulic locked piston type hydraulic feed deep hole crankshaft drilling machine	Make balance corrections	Edlund Model 1-A geared power feed drilling machine
File burrs and peen oil holes	Bench	Check corrected balance	Olsen dynamic balance checking machine
Finish grind No. 2 and No. 3 line bearings	10 x 36 in. Norton type "C" semi-automatic grinding machine	Drill 27/32 in. hole 27/16 in. deep in flange end, and 25/32 in. hole 115/16 in. deep in gear end	No. 121 Baker 2-spindle drill press
Finish grind No. 4 (rear) bearing to width and finish grind outside diameter of flange	10 x 36 in. Norton type "C" semi-automatic grinding machine	Recess flange end 3 1/16 in. diameter 1/16 in. deep	No. 321 Baker single spindle drill press
		Straighten	General No. 203, 20-ton straightening press
		Redrill, counterbore, and tap center hole in gear end	Warner & Swasey No. 6 turret lathe with 6-face turret

In addition, there is a large area containing the run-in stands; a row of dynamometer test rooms; a master gage laboratory; and an excellent maintenance department with its own machine shop.

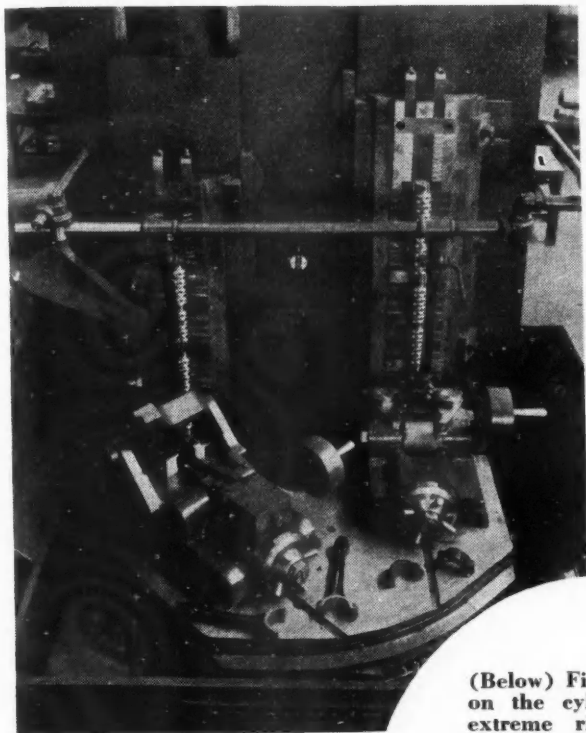
Factory executives doubtless will be interested in the details of the

set-up and although it would be quite impractical to cover the entire picture, we intend to discuss a few of the interesting operations at some length. For the rest, we believe that the excellent group of factory views supplemented by a number of formal factory routings will provide a rather comprehensive perspective. In the first place, the whole philosophy of plant layout and mechanization is based on the principle of interchangeability of major parts, as mentioned earlier.

Even then with a volume of only 200 units a day, exclusive of possible service parts, production equipment must be carefully chosen from the viewpoint of maximum economy and utilization. Consequently, on the cylinder block line, as an example, they have selected the most modern equip-



Part of battery of Fox multiple spindle drilling machines set up on the cylinder block line



Close-up of work station of first operation Cincinnati broach on con rods and caps. Note the detail of the broaching tool for finishing the half-round joint face

ment available but the machines in general are of one-way type instead of the multiple-way (three-way, four-way, etc.) types found in high production plants.

For this reason, the cylinder block line probably has a larger number of individual machines than is customary for the number of operations involved. In the interest of economy of space, the long line is folded in a number of lanes and loops, the entire sequence being organized into a compact and smoothly flowing sequence by the gravity roll conveyor.

While the cylinder block routing gives a complete picture, we have selected a few high-spots for discussion. The biggest machine in the plant is the rotary table Newton milling machine which holds ten blocks at a time. A Cincinnati Hydro-Broach is used for finishing the bearing locks and bearing half. The broaching tool is composed of a number of individual high-speed-steel sections, first a section for roughing the bearing locks, then a circular section for finishing the half-round bearing, and finally a finishing section for the bearing locks.

Another interesting group is that of the three Natco two-way drilling machines for the oil pump and distributor holes. Toward the end of the line is a battery composed of two

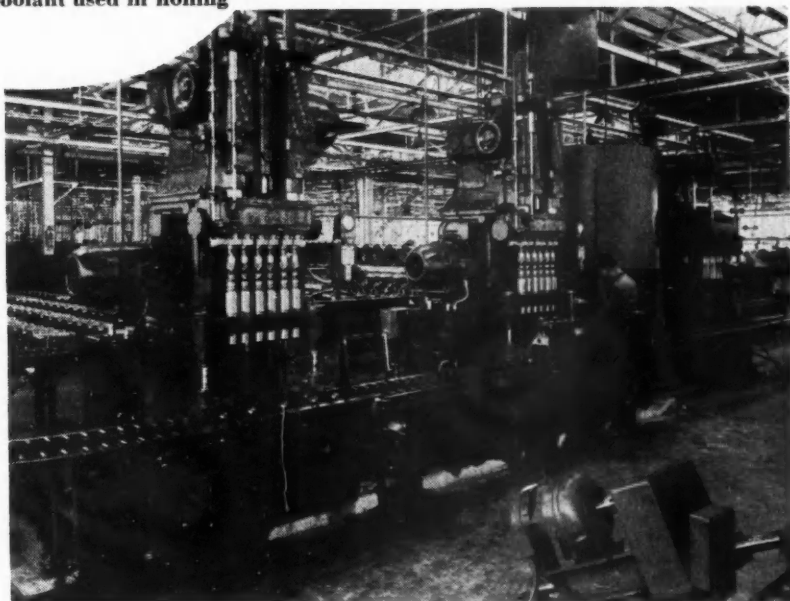
(Below) Finishing operations on the cylinder bores. At extreme right is the new Baush precision boring machine using single-point cemented-carbide cutters. In foreground is battery of the new Barnes hydraulic honing machines fitted with Micromatic hones. The first machine rough-hones; the second, finish-hones. At the right may be seen the tank which is a part of the circulating and filtering system for the coolant used in honing

honing tool in its travel. The battery includes a compact system for circulating and filtering the mixture used for cooling the tools.

Valve guide holes are given particular attention. They are drilled in a multiple drill set-up, then reamed with a single spindle tool, then burnished by hand. The burnishing tool is quite interesting as it contains five strips of Carboloy which produce a beautiful lapped finish.

Cleanliness is a cardinal virtue in cylinder block machining. The block is washed in a tank containing a hot caustic soda solution before entering the machine line. Then after completion of all machining operations, the blocks pass through a new Blakeslee washing machine.

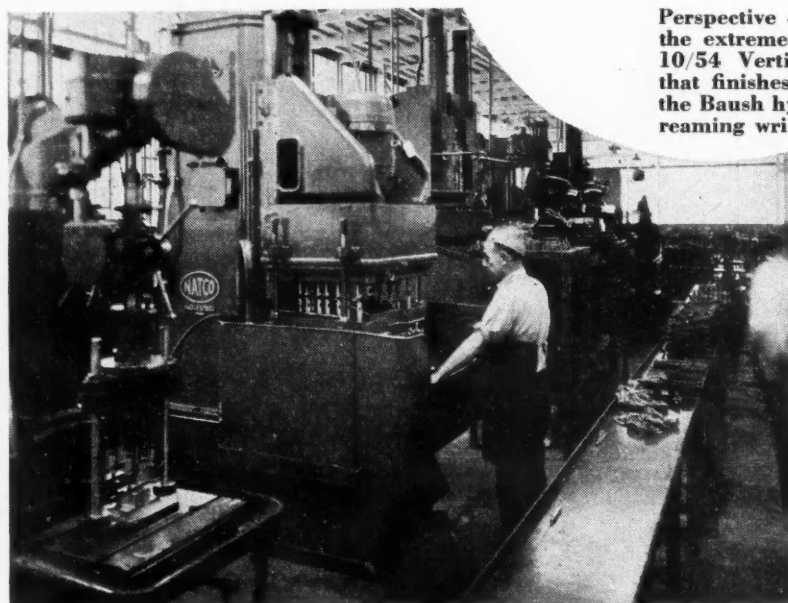
The crankshaft line is the finest example of modern practice to be found anywhere. For turning operations they have a beautiful line of new LeBlond lathes including one machine having five stations. A big Cincinnati Duplex milling machine is used for milling the locating spots, taking two shafts at a time. Two rows of plain crankshaft grinders of the latest type have been installed. Norton grinders are used for finish-



of the latest type Barnes honing machines—one for rough-honing, the other for finish-honing. The machines are fitted with six automatically adjusting micromatic hones operating in a hydraulically controlled fixture which supports the entire

ing the main bearings; Landis grinders finish the pins.

A heavy-duty Baker drill is set up for drilling the four holes in the crank flange. The machine is fitted with a massive vertical fixture which holds three shafts at a time.



Perspective of connecting rod machining group. At the extreme right, in the background, is Cincinnati 10/54 Vertical Duplex surface broaching machine that finishes the half bore and joint face. Next is the Baush hydraulic drilling machine for drilling and reaming wrist pin holes. Then the second Cincinnati Hydro-Broach, followed by the Natco machine in the foreground. The latter drills and reams con rod and cap bolt holes. The Edlund drill in the left-hand corner is used for spot-facing top of cap

There is an interesting group of automatic sensitive drilling machines for the various oil holes. And last but not least is the group of Olsen-Lundgren balancing machines that check for dynamic balance 100

per cent. As mentioned earlier, following the two dynamic testing machines there is another machine for checking static balance.

All of the crankshaft operations are tied together by the installation

of a closed loop, heavy-duty overhead rail on which the shafts are transported in heavy rectangular steel frames holding four shafts at a time.

In keeping with the philosophy of planning here, the crankshaft line is sufficiently flexible to handle the machining of all four shafts. Indeed this was a rather simple matter to take care of since the only difference between the shafts is the crank throw.

Maximum interchangeability is found in the case of the camshaft as it is used on all four models without change. The camshaft is made of electric furnace cast iron alloy mate-

(Turn to page 180, please)

Factory Routing Connecting Rod

OPERATION	EQUIPMENT	OPERATION	EQUIPMENT
Broach sides of crank bore	Cincinnati duplex vertical broaching machine	Grind contours of bolt bosses to match	Ford-Smith Model No. 901 electric tool and grinder
Weigh and sort in groups	Toledo gravity - gram scale	Grind crank bore	Heald No. 72-A-3 Gage-matic internal grinder
Broach joint face and 1/2 round on connecting rod and cap	Cincinnati duplex vertical hydraulic broaching machine	Assemble and press in place (1) piston pin bushing	General flexible press
Drill and ream piston hole	No. 1 Baush hydraulic center feed multiple drill	Chamfer both sides of wrist pin hole after assembling bushing	Sundstrand No. 53 double end drilling and chamfering machine
Broach locating spots		Burnish wrist pin bushing	General flexible press
Chamfer both sides piston pin hole	16 in. Fosdick hi-speed drill press	Weigh crank end	Bench
Grind joint face (also grind joint face of connecting rod cap)	Gardner double disc grinder	Machine crank pin end to weight, and re-weigh	Toledo Precision scale
Drill, rough ream, and ream 2 bolt holes in each rod	Natco vertical Holesteel machine	Weigh piston pin end	No. 1-12 Cincinnati plain automatic milling machine
Chamfer (2) bolt holes to 90 deg. x 1/4 in. diam. head end of bosses	16 in. Fosdick hi-speed drill press	Machine piston pin end to weight, and re-weigh	Toledo precision scale
Drill (1) 3/16 in. hole 1/4 in. deep and 1/16 in. hole through and chamfer joint face of (2) bolt holes	3 - spindle Edlund drill press	Burr piston pin end	No. 1-12 Cincinnati plain milling machine (automatic)
Mill bearing lock slots in rod and cap	Milwaukee milling machine	Drill oil hole in piston end and countersink	Bench
Burr	Bench	Diamond bore piston pin	14 in. Leland - Gifford drilling machine 2-spindle multiple head
Wash	Tank		No. 121 Coulter 2-spindle vertical type diamond boring machine
Assemble cap and tighten to connecting rod	Bench	Wash	Tank
Grind one side of crank bore	No. 22 Heald 12 in. rotary grinder	Blow off and place on bench	Table
Ream crank bore hole	Baush No. 5 unit type—6-spindle drilling machine	Check for alignment and straighten	Air hose
Chamfer both sides of crank bore	Sundstrand No. 56 heavy duty double end centering machine	Inspect	Bench
Grind second side of crank bore	No. 22 Heald 12 in. rotary grinder	Check for correct weight on crank end and piston pin end	Toledo precision scale
		Hang on overhead conveyor running through washing machine for oleum spirit rinse and blow off	Blakeslee washing machine as used on piston

Automatic Safety Shutdown Device for Diesel Railcar Engines

ORDINARY means of keeping tab on the lubricating system, such as an oil gage or a pressure gage, are not entirely satisfactory in the case of railcar Diesel engines, partly because the driver has to watch for traffic signals and cannot watch indicators also, and partly because in Diesel engines, on account of the high combustion pressures, a failure of the engine lubrication system may cause serious damage and even result in the destruction of the engine. A device which automatically shuts down the engine when the lubrication fails is desirable. However, it is not practical to base such a device on fixed pressure limits in the lubrication system, for the reason that the viscosity of the lubricating oil changes greatly with its temperature, and the device might go into action when the engine was being throttled down while hot, when, because of the low viscosity of the oil and the low speed of the engine, the oil pressure naturally will drop to a low value. In the opposite case of a cold engine, the device might not go into action even though an oil pipe was leaking, since with the very viscous oil the pressure might not drop to the point for which the device was set.

Ganz & Company of Budapest, manufacturers of railcar Diesel engines, have developed the device described in the following, which takes account of these conditions: The oil pump forces the oil through a cooler and filter to the bearings, and owing to the considerable resistance to flow of the cooler, the pressure on the oil in the pipe to the cooler is some 30 to 40 per cent greater than that in the pipe from the cooler and filter to the bearings. The resulting pressure difference is a function of the engine speed, the rate of oil flow, and the viscosity of the oil, which latter is dependent on the oil temperature. However, the ratio of the pressures at the inlet to, and the outlet from the cooler is practically constant, since the factors mentioned in the foregoing as affecting the oil pressure are the same for the entire system.

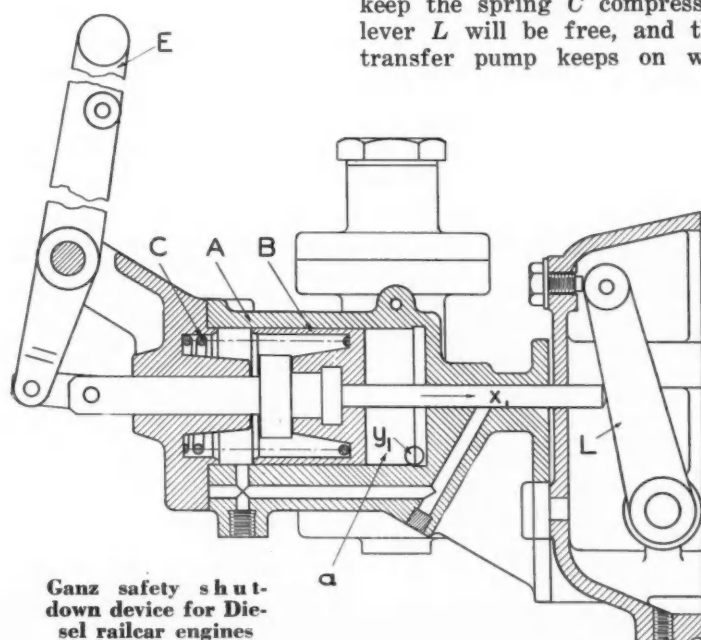
The device illustrated by the accompanying drawing is secured to the fuel transfer pump in such a way that the spring *C*, acting on piston *B* and through piston rod *x*, and level *L*, tends to constantly stop delivery by the fuel transfer pump. On the other hand, oil from the lubricating system enters the chamber *a* through port *y*₁, and if there is sufficient pressure on this oil, the piston *B* will keep the spring *C* compressed, the lever *L* will be free, and the fuel transfer pump keeps on working.

The ratio between the areas on opposite sides of piston valve *D* is equal to the ratio of oil pressures referred to in the foregoing. Space *b* underneath piston *D* is connected to the oil line immediately ahead of the bearings through the port *y*₂, while the space *c* communicates with the oil line ahead of the cooler through port *y*₄. If the lubricating system of the engine is functioning properly, piston *D* is held in equilibrium and occupies the position in which it is shown in the drawing. The lubricating oil on its way to the bearings passes through port *y*₃ into space *b* and thence through port *y*₁ into space *a*, holding piston *B* in the position in which it is shown in the drawing, where the spring *C* is compressed. In space *a* the oil pressure, therefore, is the same as immediately ahead of the bearings. The device comes into action under three conditions:

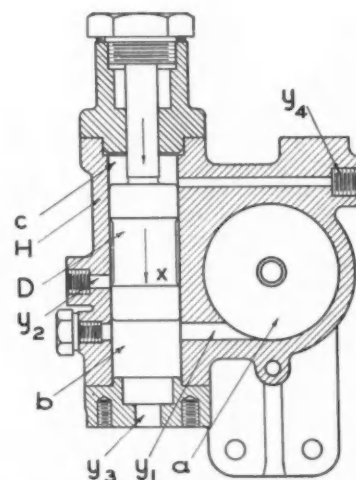
1. In the event of a complete lack of oil, or if the oil pump does not deliver, the pressure in space *a* drops below atmospheric, and spring *C* then moves piston *B* and through lever *L* shuts off the fuel transfer pump.

2. If a bearing should burn out, the oil pressure ahead of the bearing will drop greatly. This results in a change in the ratio between the oil pressures at the bearing and ahead of the oil cooler, the piston *D* is

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Ganz safety shutdown device for Diesel railcar engines



Oil for Winter

driving should be of no lower viscosity than that used in summer, says S.A.E. speaker

IN recent years there has been a strong tendency toward the use of lighter engine oils, particularly for winter operation, to facilitate cold-weather starting. But there must be a limit below which it would be dangerous to go, and Stanwood W. Sparrow of the Studebaker Corporation, in a paper presented at the Summer Meeting, furnished considerable information having a bearing on this problem. Mr. Sparrow introduced his discussion by remarking that "by a strange coincidence" the engineer's interest in cylinder-wall wear seemed to have increased

der head removed, all bores having been wiped clean and dry prior to the test. The average time was about 7 minutes with the No. 10 oil, and 17 minutes with the No. 50 oil. The relatively long time required for ex-

and the specific fuel consumption of the engine is shown in Figs. 1 and 2, in which the full lines refer to tests with No. 50 oil and the dashed lines to tests with No. 10 oil. In the tests the average jacket-water outlet temperature was 170 deg. Fahr., and the crankcase oil temperature varied between 160 and 180 deg. Fahr. The No. 50 oil had a viscosity of 205 and the No. 10 oil of 50 S.U.V. at 170 deg. Fahr. The oil consumption is materially less with the more viscous oils, and in one case the rate of consumption at 50 m.p.h. was one gal. in 794 miles with the No. 10 oil and one gallon in 1675 miles with the No. 50

Table I—Viscosities of Various Engine Oils at Standard Temperatures and Cranking Speeds with these Oils

Oil	VISCOSITY, Saybolt Universal Seconds			Cranking Speed
	at 210 deg. F.	at 130 deg. F.	at 0 deg. F.	
S.A.E. 10	42.8	77.5	3,500	59.7 r.p.m.
S.A.E. 20W	52.5	144	21,000	31.3 r.p.m.
S.A.E. 20	50.5	150	48,000	16.8 r.p.m.
S.A.E. 30	63.0	264	220,000	10.5 r.p.m.

since the driving public became conscious of the merits of low-viscosity lubricants.

The advantage of low-viscosity engine oils from the easy-starting standpoint is evident from table I, which gives the cranking speeds of a six-cylinder 226-cu. in. engine at zero Fahr. when the crankcase was filled with S.A.E. 10, 20W, 20, and 30 oils respectively. A production battery was used; it was recharged between successive runs and was checked to show a gravity of 1.300.

It is important that the oil be able to reach its destination quickly, and how different oils compare in this respect was brought out in a table accompanying the paper which gave the times required for excess oil to appear at the tops of individual pistons with S.A.E. 50 and S.A.E. 10 oils respectively when the engine was motored at 700 r.p.m. with the cylin-

cess oil to show on top of the pistons was due to the effectiveness of the piston rings, for without rings on the pistons a test run with No. 10 oil showed oil on the cylinder walls in less than 10 seconds.

How the oil viscosity influences the brake torque, the friction torque,

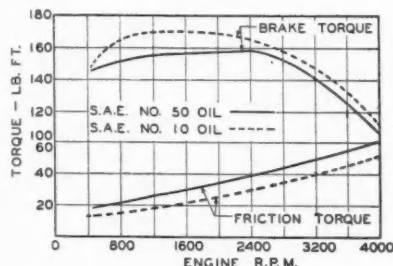


Fig. 1—Effect of oil viscosity on brake torque and friction torque

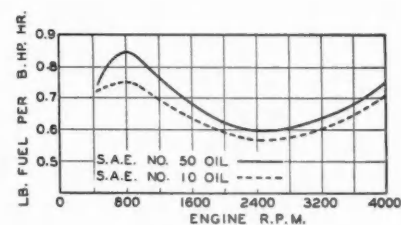


Fig. 2—Effect of oil viscosity on specific fuel consumption

oil. The viscosity also has an effect on the rate of blowby, and in one instance the substitution of No. 40 for No. 20 oil reduced the blowby from 1.7 to 0.5 cu. ft. per min. In another case with an engine speed of 4500 r.p.m. the blowby increased from 3.2 cu. ft. per min. with No. 40 to 6.6 cu. ft. per min. with No. 10 oil.

As to the effect of oil viscosity on bearing life, in one case it was found that the life of connecting-rod bear-

ings at 4500 r.p.m. could be extended from 15 to 50 hours by substituting No. 50 for No. 20 oil. While tests showed that the delivery rate of the oil pump is slightly greater with the heavy oil, Mr. Sparrow did not think that this explained the increased bearing life. It is fairly evident that if the bearing life is greatly increased, the bearing receives a more plentiful supply of oil, and in the author's opinion the reason is as follows (Fig. 3): At high speeds the flow of oil to the connecting-rod bearing is governed very largely by the centrifugal force developed by the column of oil in the crankshaft. To force oil into the crank, assuming the oil hole to be empty, it is necessary to build up sufficient pressure to overcome the centrifugal force produced by a column of oil extending from the center line of the main journal to its surface, as indicated by the solid black area in Fig. 3. A

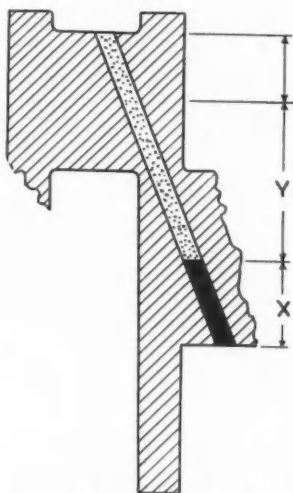


Fig. 3—Showing that the oil flows from the bearing surface to the crankshaft axis in opposition to the centrifugal force on it

reduction in viscosity reduces the pressure at the main bearing, and hence decreases the force tending to produce flow into the main journal, but it does not materially reduce the centrifugal force resisting the flow. By the same line of reasoning, if the capacity of the pump is sufficient to keep the hole in the crankshaft full of oil, then the effect of a reduction in viscosity will be a marked increase in the rate at which oil is discharged from the crankpin.

The choice of an oil of safe viscosity depends on the temperature at which it is to operate, and what

this temperature is likely to be was shown by a graph accompanying the paper from which it appeared that for ten 1938 automobile engines the oil temperature at 70 m.p.h. ranges between 89 and 178 deg. Fahr. above atmospheric temperature, while at maximum car speed it ranges between 105 and 195 deg. Fahr. above that temperature.

The author expressed the opinion that the scuffing of piston rings which occurs at low speeds is due more to lack of oil than to insufficient viscosity. The characteristics

of the material used in main and connecting-rod bearings are such as to reduce to a minimum the damage caused by a momentary failure of the oil film. Recent developments in the surface treatment of piston rings constitute a step in the same direction. Such treatments definitely increase the resistance to scuffing when the engine is operating near the border line of safe lubrication.

An increase in the viscosity of the oil often increases the resistance to scoring of the pistons, particularly during the running-in period. In



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running in one engine, a period of part-load operation was followed by two hours under full load at speeds of 2500, 3000, 3500 and 4000 r.p.m. This running-in schedule was completed without trouble with No. 40 oil, but when an attempt was made to repeat it with No. 20 oil, a piston scored at 2500 r.p.m.

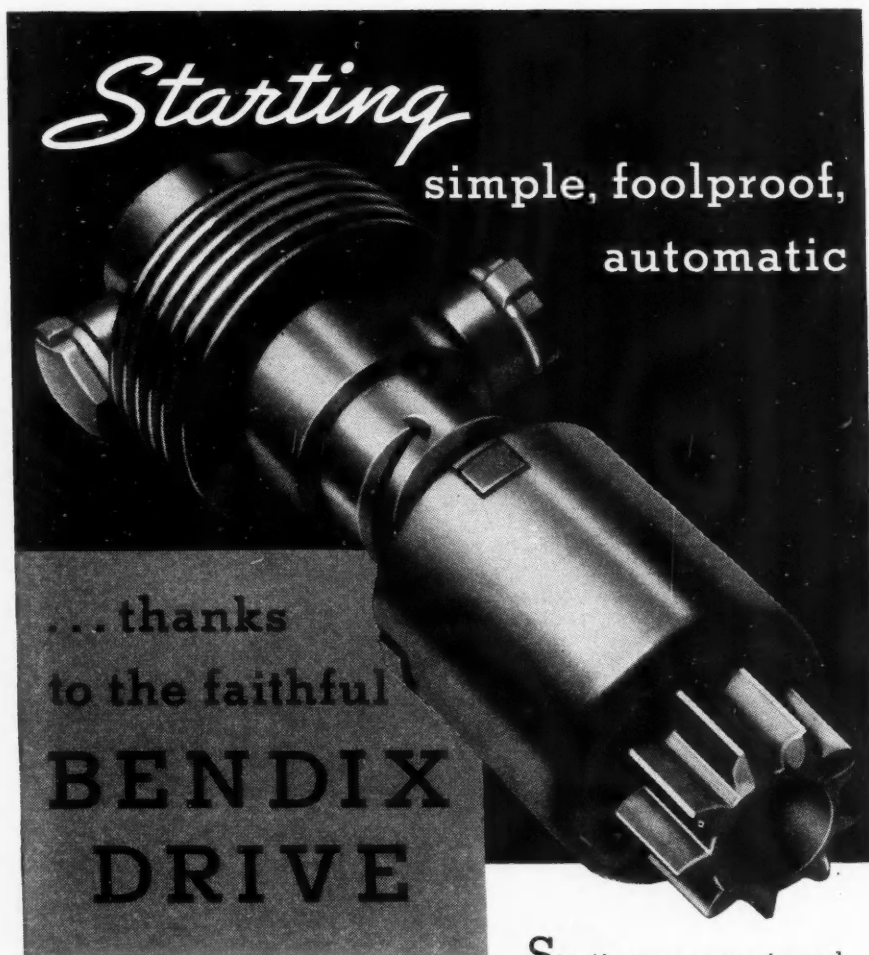
Few owners realize that lack of proper precautions in winter operation may leave the cylinder bores in such a condition that the danger of scoring is greater than with new bores. In one experiment, an engine

was started one hundred times and was allowed to run only until it fired regularly in the three cylinders to which spark plug wires were connected. The test was made at 70 deg. F., but winter conditions were simulated by using an oil too viscous to be thrown freely on the cylinder walls. Although the lubrication of cylinders 4, 5 and 6 must have come from the gasoline thrown on the walls, these cylinders, which did not fire, were not harmed. In the cylinders which did fire, however, the water, which was condensed when the

burned charge came in contact with the cold walls, caused the rings to rust badly.

Mr. Sparrow believes that the viscosity of the oil used in a new engine should be at least as high as that which is specified for an engine that is well run in. He admits, however, that there are good arguments in defense of the common practice of breaking in an engine with an oil of low viscosity. Evidently, more of the high spots will break through the film when an oil of low viscosity is used, which means that the high spots will be worn down at a more rapid rate, and this is desirable provided the heat generated is not sufficient to cause scuffing or scoring. In his opinion, however, the greater protection against scoring which is provided by a more viscous oil more than compensates for the added time required for the wearing-in process.

Engines which have operated satisfactorily throughout the summer frequently develop trouble with the pistons and rings during the winter months, and the author expressed the view that a large proportion of such failures are due to a combination of high jacket-water temperature and lubricants of low viscosity. If a car has adequate cooling capacity and thermostatic control of the jacket-water temperature, then the average temperature of the jacket is likely to be as high in winter as in summer. It is well, therefore, to recognize the fact that as far as pistons and rings are concerned, to be safe, the viscosity of the lubricant should be as high for winter operation as for summer.



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DRIVE**

Starting a car equipped with a Bendix Drive is as easy as ringing an electric door bell. You simply touch a button—and the Bendix Drive takes command. Automatically, it takes hold, cranks, lets go, then protects the starter from damage in case of inadvertent operation.

The Bendix Drive keeps faith with the driver all the time. And motorists know it. Thus, they prefer the car that's Bendix-equipped.

ECLIPSE MACHINE COMPANY

ELMIRA, NEW YORK

(Subsidiary of Bendix Aviation Corporation)

German Drivers Now Show Trend for Improved Cars

A survey of German registration figures for 1936 and 1937 indicates that German automobile buyers now go in for somewhat more expensive cars, as the average price of all new cars registered in 1937 were 3200 marks (\$1,290) as compared with 2850 marks (\$1,150) for 1936. The explanation is thought to be that a great many persons in Germany during the past four or five years bought their first cars; first buyers usually go in for the lowest-priced cars, but after some years experience they are willing to pay a little more for additional performance and additional comfort. A similar trend was quite noticeable in the United States some 30 years ago.

Rider Comfort Analyzed

H. A. HICKS and G. H. Parker of the Chrysler Corporation presented a paper on "Harshness in the Automobile," at the SAE Summer Meeting. They pointed out that an ideal car would run at speed over an ordinary road in such a manner that the only indication of motion would be the sight of the passing landscape; no shakes or jolts would be felt, no car noises heard, and no offensive odors perceived. Human faculties would be unhindered, and would remain unimpaired for the complete enjoyment of a journey.

There are many kinds of car harshness which affect the human senses. Harsh noises assail the ears; wheel fight and wheel shake feel

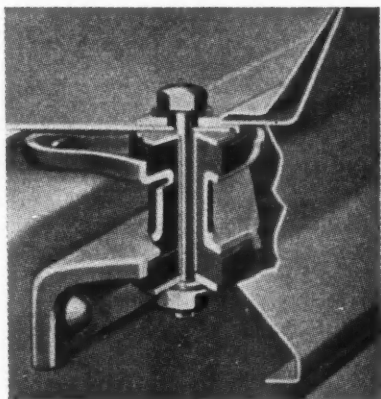
harshness in various ways, as follows:

1. The increased rigidity has almost entirely eliminated any secondary-suspension effect from the structure. If previously the deflections of the structure itself made up for deficiencies in the suspension, then with unit construction the suspension must be further refined.

2. Increased rigidity raises the

natural frequency of the structural assembly of the car, and it is quite possible that the frequency has become such that the structure responds to blows from the road with a harsher vibration than in the more flexible structure. The most practical method of attacking this problem is to soften the blow.

3. As the rigidity is increased by forward extension of the structure, toward or over the front axle, body loads are increased. If an automobile with a body that provides great



Rubber insulator for automobile chassis

harsh to the driver; body jitters and shudders are unpleasant to all of the car occupants. Harsh vibrations which affect our sense of feeling may emanate from the powerplant and the tire contact with the road. In their paper the authors confined themselves to a discussion of harshness resulting from tire-road contact.

One of the basic advantages of unit construction, that is, of building the body integral with the frame, is the additional rigidity which it provides. This greater rigidity is obtained by extending the body further forward, over a greater part of the complete car length. Either the cowl is extended as a deep cantilever, or else inclined struts are used to brace this part of the car span. But unit construction tends to be harsh, the more so the greater the rigidity attained. Stiffness can influence

Stop this man FROM A COMPENSATION CLAIM



This man is in danger. He is in contact with cutting oils. Dangerous pus-forming germs—germs which enter cuts and scratches on arms and hands, lurk in cutting oils. Quickly pimples and boils appear, demanding medical care. Thus another worker goes home, laid up with oil dermatitis. And another claim for compensation must be paid.

OIL DERMATITIS MUST BE PREVENTED

How can you stop paying for losses that are costing plant owners and insurance companies millions of dollars each year? Very simply. Just *sterilize* all cutting lubricants with Derma-San. One pint of Derma-San added to 35 gallons of cutting lubricant kills oil dermatitis germs *before* they reach your workers.

DERMA-SAN IS DOING A REAL JOB

Thousands of plants use Derma-San because they cannot afford to be without it. They know that using Derma-San is a safety measure that promises genuine protection. Used in *your* plant, it will save you money. It will help keep your workers on the job . . . bring increased efficiency. It may also bring reduced insurance premiums. You need Derma-San protection *now*. Order a drum — *today*.

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D I S I N F E C T A N T

rigidity strikes a bump, greater loads are introduced into the body than with the less rigid car. Stressed bodies which transmit more load will transmit shocks to the passengers.

4. In the past, every effort has been made to reduce the unsprung weight. However, the real criterion is not the magnitude of the unsprung weight, but the ratio of the sprung to the unsprung weight. A rigid structure will hold all items of weight distributed over its whole length in constant relationship with one another. They then resist as one

mass all attempts from an outside mass to excite vibration, and the result will be an increase in effective sprung weight without addition to the actual car weight.

Attempts have been made to reduce harshness by the use of cushioning pads. With a frame of the conventional X-type, rubber-spool insulators are placed between the body and frame at the points of attachment. Their movement is limited, so that in the event of serious structural distortion, the body functions with the frame, whereas in the case

of small movements the insulators soften the car. Any loss in stiffness, however, even though it be small, is begrudged, since structural rigidity is a primary aim.

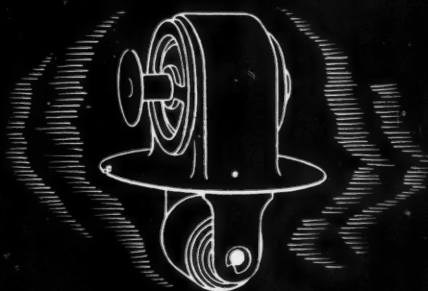
Another type of insulator against harshness and noise has been developed for use at the spring ends. Insulation at these points has real advantages, as there is no reduction in structural rigidity, and the insulation can be applied equally well to both the conventional and the unit type of construction. The insulation here is placed closer to the source of vibration.

These insulators, or shock and vibration cushioners, consist of rubber bonded to small metal disks, so mounted at the spring ends that the rubber is loaded in shear. They are free to deflect in all directions in a vertical and longitudinal plane, but are definitely limited laterally. For the front independent suspension, the shear rubber may be built into the knuckle support. Since deflections up to 3/16 in. each way from the normal position are easily obtainable, it results from the equation "energy = force \times displacement" that if the deflection with the normal spring connections under a given load were even as much as 1/32 in., it would be reduced to one-sixth its former value by the insulators. While only few tests have been made thus far, this method of insulation has shown promising results in harshness reduction.

Diesel Engine Lubricants

IN discussing the paper on Improvements in Diesel-Engine Lubricating Oils by Aldrich B. Bray, C. C. Moore, Jr., and David R. Merrill of the Union Oil Co. of California, G. L. Neely, research engineer of the Standard Oil Co. of California, said that although from the standpoint of engine protection the intrinsic properties of the lubricants are quite important, a far more striking advance has been made by chemical treatment of the frictional surfaces. The Standard Oil Company of California, he said, had developed and patented the Feritex chemical process for that purpose. The treatment consists essentially in dipping the machined parts in a chemical bath at a temperature which does not impair the effects of heat treatment, nor cause distortion of the parts. The solution reacts with the original surface of the metal, and established manufacturing limits and tolerances are not affected.

(Turn to page 182, please)



PRECISION BUILT TO MAINTAIN PREDETERMINED TEMPERATURE CONTROL

● Because automotive engineers constantly stake their reputation on equipment's ability to perform under a wide variety of road, load and weather conditions, they can make no compromise with precision.

It is significant that a large majority of leading automotive engineers depend on Dole Thermostats for precise predetermined motor temperature control... and specify Dole Thermostatic Bi-Metal to assure accurate temperature response in devices of their own development.

Dole Double Port Poppet Type Thermostat... the leader in a line of star performers... positively eliminates sticking, binding and friction; it is balanced to control the circulation and temperature of water regardless of pump pressure.

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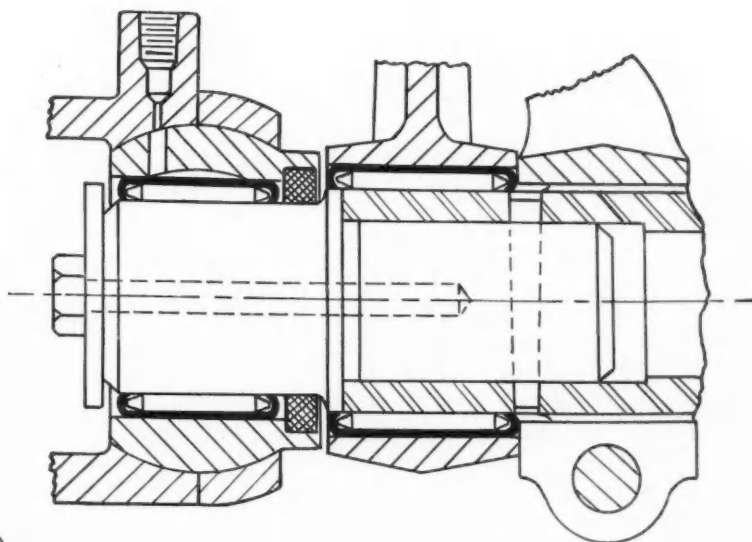
Detroit Office: General Motors Building

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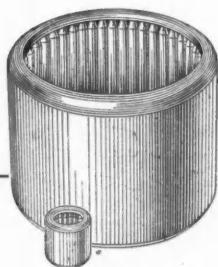
Thermostats AND THERMOSTATIC BI-METALS

TORRINGTON NEEDLE BEARING

DESIGN AND SERVICE FEATURES



BRAKE CROSS SHAFT—A TYPICAL AUTOMOTIVE APPLICATION IN WHICH THE TORRINGTON NEEDLE BEARING CAN BE QUICKLY ASSEMBLED.



UNIT CONSTRUCTION SPEEDS ASSEMBLY PROCESS

Ideal for Line Production Methods

THE UNIT CONSTRUCTION of the Torrington Needle Bearing greatly simplifies the process of installation, and makes the bearing ideally suitable for use with assembly-line production methods. Typical of the mechanisms in which the bearing is easily mounted is the brake cross shaft illustrated.

The shape of the bearing also aids in speeding the assembly process by permitting simplification of the housing design. Having a small diameter in proportion to its length, the bearing can be mounted in the simplest type of housing, requiring only a bore of the correct diameter.

High Unit Capacity

The high radial load capacity of the Needle Bearing permits its use for severe loads in either rotating or oscillating applications. Small sizes can be used for heavy duty, with a corresponding reduction in housing weight and size.

The needles are constantly lubricated by the ample supply of grease or oil held

by the turned-in lips of the hardened retaining shell. Little service attention is needed, as the supply of lubricant is usually sufficient for long periods.

Low Cost Factors

Low unit cost of the Torrington Needle Bearing and the economies which it offers in assembly place the cost of *complete anti-friction construction* for many types of application on a cost basis comparable to the use of ordinary friction bearings.

Manufacturers wishing to investigate

these advantages are invited to profit by the experience of the Torrington Engineering Department in laying out applications. Further information is given in the Torrington Needle Bearing Catalog, available on request. Write for Catalog No. 7.

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ESTABLISHED 1866
Torrington, Conn., U.S.A.

Makers of Ball and Needle Bearings

Branch Offices in all Principal Cities

TORRINGTON

NEEDLE BEARING

Production of Chrysler Engines in Canada

(Continued from page 172)

rial and takes a rather simple sequence of operations. All camshafts are inspected 100 per cent for control of dimensions and cam form on the Pratt & Whitney Camshaft Comparator.

There is a beautifully tooled line for pistons as may be noted from the

routing. One of the most interesting items of equipment is the Snyder machine for exact weight machining of the piston which is done automatically. After machining the pistons are given the Chrysler anodizing treatment in an automatic electrochemical equipment. Before final

gaging, each piston is heated or cooled to a temperature of 70 deg. Fahr. in a special temperature control unit.

Final inspection of pistons uses a number of the new Sheffield gages. A unique Pratt & Whitney Electrolimit gaging set-up has been developed for automatically checking ring groove depth and concentricity simply by pushing the piston through a two-stage fixture. A system of red and green tell-tale lights indicates "accepted" or "rejected" work.

From the viewpoint of the visitor, the high-spot in the piston department is a short-coupled overhead monorail conveyor communicating between the piston and connecting rod line. It carries matched sets of pistons and rods for an engine from the inspection bench through a Blakeslee "Niagara" washer, thence to the stores bench for distribution to the assembly line.

Among the many miscellaneous operations is the short line for flywheel machining including a battery of two Gisholt Simplimatic lathes that completely finish the flywheel in the two settings. Ring gears are shrunk on the flywheel by heating in the new Calorac electric ring expander, an induction heating machine.

A battery of two multiple-spindle horizontal Natco drilling machines are used for drilling and tapping all holes in the flywheel housing. One machine takes the drilling, the other takes the tapping. Each machine handles two housings at a time.

The connecting rod routing gives the details of an interesting line. Perhaps its outstanding feature is the battery of Cincinnati Hydro-Broach surface broaching machines that finish rod and cap ends completely. A Natco drilling machine handles the drilling, taking four rods and four caps at a time. A Bausch machine bores the big ends after broaching, taking six rod and cap assemblies at a time in the fixture.

Big ends are finish-ground on a Heald Gage-Matic internal grinder, after boring, in preparation for assembly with the precision bearing shell. The wrist pin hole is fitted with a bronze bushing which is bored on a two-spindle Coulter diamond-boring machine using Carboloy tips.

The first of the broaching operations mentioned above is that of finishing the half bore and joint face on a Cincinnati 10/54 Vertical Duplex machine. Rated hourly production runs 160 rods and 160 caps, a total of 320 pieces per hr. The broaching tool operates at a ram speed of 28.6 ft. per min., removing 5/32 in. stock (max.) on the rod,



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A. S. KIRKEBY, *Managing Director*

The Drake

LAKE SHORE DRIVE - CHICAGO

and 0.093 in. (max.) on the cap.

Details of the sequence of operations are as follows:

Fixture registering to left-hand ram holds one connecting rod for operation of broaching the half bore and joint face. The work rests in the broached crank cheek face and coined wrist pin boss.

Fixture registering to right-hand ram holds one cap for operation of broaching half bore and joint face. The work rests on the broached crank cheek face and is located from two fixed stops against the rough nut seats for cap bolts.

Both fixtures are of the adjustable type as used for rods and caps which are weighed before the broaching operation. In weighing, the work is divided into groups of different weight. Consequently, each group requires a different stock removal, and this is accomplished by adjusting the fixture.

The second surface broaching operation is handled on a 5/54 Duplex Vertical machine, having the same production rate as the first operation machine. Ram speed, cutting, is 25.3 ft. per min. This operation finishes the crank cheeks, bolt bosses, and locating pads.

The fixture registering with the right-hand ram holds one rod and one cap, stacked one above the other, for broaching the crank cheek faces, with stock removal of 0.090 in. (max.). The second fixture, registering with the left-hand ram, holds a rod and cap side-by-side, for broaching bolt bosses and locating pads.

Due to the difference in the length of connecting rods produced here, the fixture is designed to take the longest rod, normally, and is provided with a series of locaters for intermediate rod lengths. Work is securely clamped by means of a single weighted lever.

The final assembly line, illustrated here, is served by an overhead high-cycle power distribution line, feeding the high-cycle portable tools used for the various fastenings. The tools are suspended overhead on the familiar Thor balancers which greatly facilitate the operator's work.

Consider finally a few additional details of the over-all picture of the factory. In all, there are in excess of 420 individual electric motor drives requiring over 3500 electrical horsepower of energy. One of the most modern features of the building is the fact that both the railroad spur and truck docks are located directly within the building without the use of outside structures.

Not only does this simplify the

materials handling problem but it permits the workers on both the receiving and shipping docks to work comfortably indoors, at the same time offering protection from the weather for raw materials as well as finished motors.

French Racing Premium Arouses Drivers' Ire

The French Government, which this year offered awards aggregating one million francs (\$28,000) to encourage the building of racing

cars suitable for competition in international races, in France, has decided to award 300,000 francs to Delage and Bugatti each, and will later award the remaining 400,000 francs to the firm which shall make the best showing during 1938. The Delahaye firm and its drivers have expressed their dissatisfaction with this distribution, basing their action on the fact that so far this year it has been the only firm that has won any laurels for France, and it has threatened to withdraw from the French Grand Prix in protest.



GUARANTEED Physical Soundness~Correct Hardness Size Accuracy and Sphericity

A special lapping practice exclusive with Strom gives Strom Steel Balls a degree of surface smoothness and sphericity that has never been equalled in any other regular grade of ball. Extreme precision can be obtained only through such a series of lapping operations.

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So it is that Strom can guarantee physical soundness, correct hardness, size accuracy, and sphericity in all Strom Balls.

Other types of balls—stainless steel, monel, brass and bronze—are also available in all standard sizes. Write for catalog, prices.

Strom

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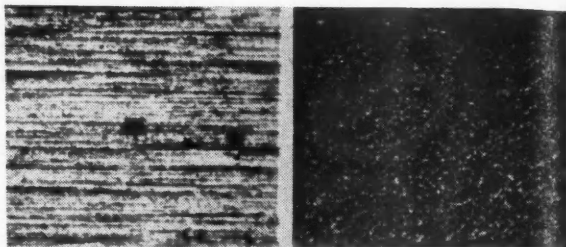
The largest independent and exclusive Metal Ball Manufacturer

Diesel Engine Lubricants

(Continued from page 178)

It is claimed that the treatment preferentially removes certain micro-constituents, such as ferrite, from the metal surface, and thereby inhibits the tendency of frictional members to weld and scuff; that it removes loosely held particles which remain imbedded in the surface following the machining operation; that the treatment produces a surface film which has extreme-pressure proper-

ties, the film being capable of carrying high loads without failure; that the treatment produces a porous or



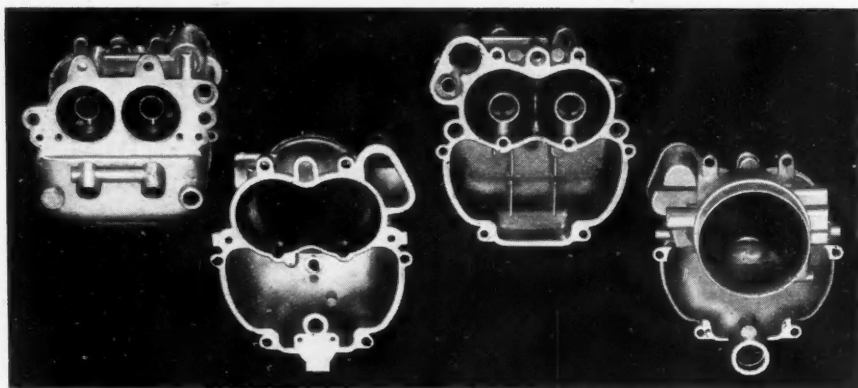
blotter-like surface which increases the spreading tendency of the lubricating oils and provides minute oil reservoirs in the wearing surface, and that the treatment expedites the removal of high spots from the surface, thus shortening the running-in time.

The two micrographs reproduced herewith show, respectively, a piston ring in the untreated condition before use and the Feritex-treated ring before use, both at a magnification of 100.

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PARAGON zinc base castings are especially suited for carburetors, as evidenced by the example of a double jet carburetor pictured above.

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Automatic Shutdown for Diesel Railcar Engine

(Continued from page 173)

thrown out of equilibrium and moves in the direction of arrow, and space *a* is placed in communication with the crankcase through passages *y*₁ and *y*₂. The pressure in space *a* suddenly drops to zero, and spring *C* then cuts off the fuel transfer pump.

3. The result is the same if, owing to wear, the clearance between journal and bearing becomes excessive, or if the oil filter should become clogged. In these cases also the ratio between the oil pressures at the bearings and ahead of the oil cooler changes, and the device goes into action.

When the device is applied to vehicle engines, provision has to be made to keep it inactive when the engine is stopped, so that the piston *B* may keep the spring *C* under compression and the transfer pump may be able to deliver fuel as soon as the engine is started again. This is accomplished by the speed governor. A locking device holds the piston *B* up against spring *C*, and as soon as the engine reaches a certain speed, the governor releases this locking device.

In Diesel railcar installations with electric remote control, lever *E* of the automatic shut-down device is connected to a switch, and in case the device goes into action for any of the three reasons enumerated in the foregoing, the engine is simultaneously disconnected from the driving gear.